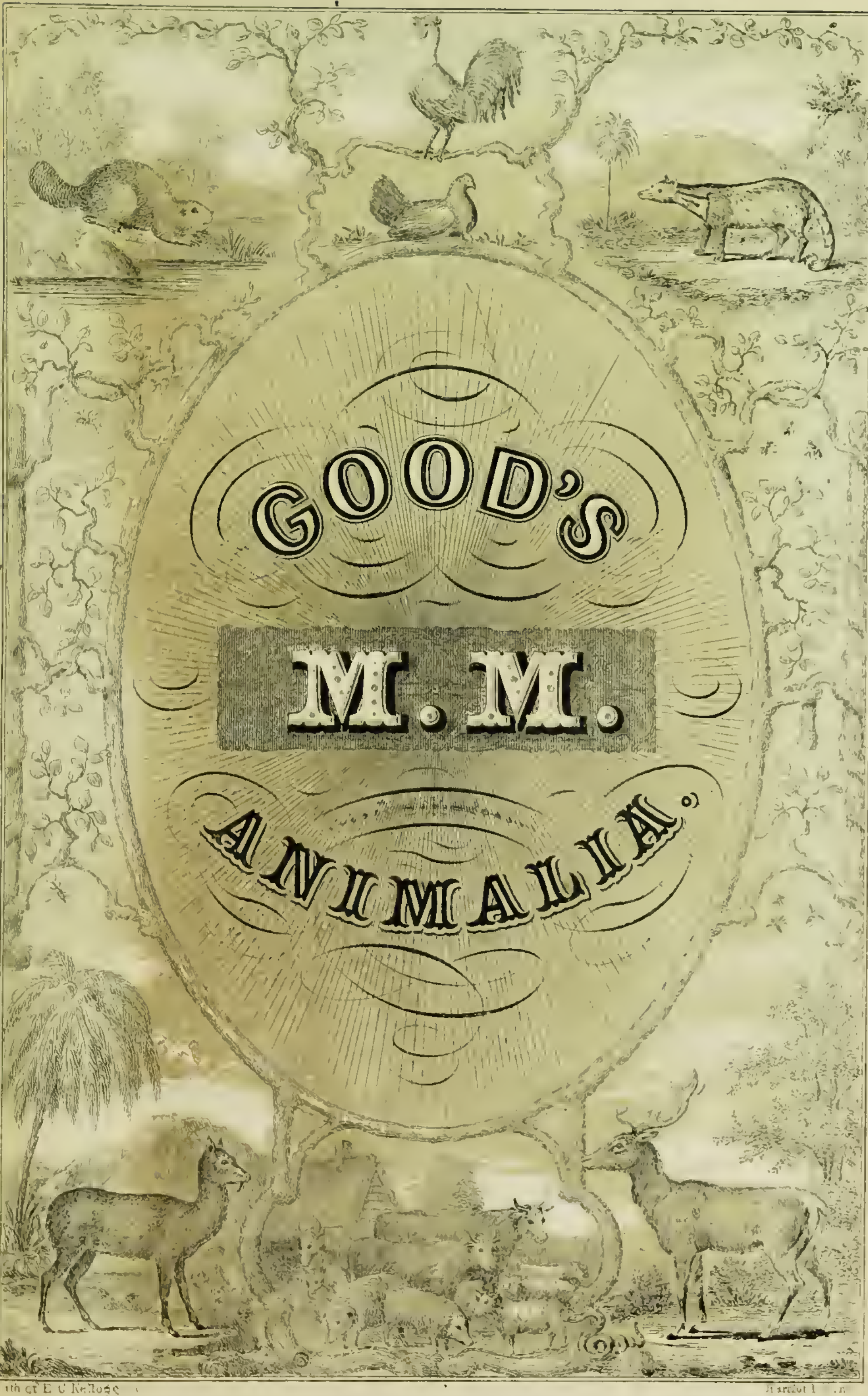

Lith of E. C. Kellogg

GOOD'S

MATERIA MEDICA ANIMALIA.

Always respectfully,

Peter P. Good.

A

MATERIA MEDICA ANIMALIA,

CONTAINING

THE SCIENTIFIC ANALYSIS, NATURAL HISTORY, AND CHEMICAL AND MEDICAL PROPERTIES AND USES

OF THE

SUBSTANCES THAT ARE THE PRODUCTS

OF

BEASTS, BIRDS, FISHES, OR INSECTS.

ILLUSTRATED BY

COLORED ENGRAVINGS

OF

ORIGINAL DRAWINGS COPIED FROM NATURE.

BY PETER P. GOOD,
EDITOR OF THE FAMILY FLORA AND MATERIA MEDICA BOTANICA.

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PREFACE.

Utility, more than either originality of contents or elegance of phraseology, has been the author's principal object in the following pages. He has endeavored to gather together in one volume, attainable at a moderate price, an arranged and easily consulted record of the entire Materia Medica Animalia, and he believes no attempt of a similar description has ever been made. To effect this object he has obtained aid from the best living authorities, as well as from their published works; but he has not neglected those of other periods, where he has found in them directions upon which the moderns have suggested no improvements.

Of all departments of science, there is perhaps no single one capable of exercising such an advantageous influence on the mind of the cultivator as Natural History, in any of its departments. Every kind of knowledge has in it something that is valuable; for even if it be of no direct utility in the ordinary concerns of the world, the acquirement of it is a useful exercise to the mental faculties, and the possession of it may operate in a most beneficial manner on the habitual feelings, and give a corresponding direction to the whole course of life.

It is desirable to cherish correct views of the benefits of different kinds of knowledge, that those may choose most advantageously for themselves whom the necessary business of life debars from the extended pursuit of it; and without undervaluing other particular branches of science, it may be safely affirmed that any department of Natural History is capable of affording more to interest and instruct, more to refresh and relax, the well-disposed mind, on a very slight acquaintance with it, than any other pursuit. Not a step can the learner advance in it, but he meets with wonders

previously unsuspected; — not a height does he gain from which his prospect is clearer and more extensive, but his notion of these wonders acquires a yet more astonishing vastness. The more he knows, the more he desires to know, and the further he advances, the more does he perceive how much delight is yet in store for him.

The beneficent Creator of all has not only ordained, that every part of his works should be *good*, — should be adapted to answer its designed end, and should contribute in the highest degree of which it is capable to the well-being of his creatures; but he has made every thing "beautiful in its season," — he has so formed the mind of man that it derives pleasure from the contemplation of the glorious works around him. And it is therefore a worthy employment of our faculties to encourage this pleasure, and to place it upon a more solid and extended foundation than that afforded by the mere forms and colors of the objects around us, however beautiful they may be.

One great source of the pleasure derived from the inquiry into the structure and mode of existence of the living beings around us arises from the beautiful adaptation of their parts to each other, and of the whole to the place it has to occupy, which we can easily trace in every one. The philosopher who studies the motions of the heavenly bodies, and the station of this earth among them, traces these adaptations no less clearly, but it requires profound and long-continued study to be able to comprehend them aright. The naturalist, however, can discern them with far less research in every animal that breathes, and he meets with a constant variety, which prevents him from growing weary of the pursuit. Yet many are too frequently kept in ignorance of the wonders and beauties around them; and whilst encouraged to learn many languages and read many books, they remain unacquainted with the bright volume of creation, the pages of which are daily and hourly unrolled before them, "written," to use the impressive words of Lord Bacon, "in the only language which hath gone forth to the ends of the world, unaffected by the confusion of Babel." But these pages are not to be read without some study; the alphabet and grammar must be learned, in order that their beauties may be rightly comprehended, and those who are entering upon the inquiry need to be rightly directed by those who are more advanced.

Natural History in general has been too much shunned, as a science of hard names and intricate classification, by those whose minds are occupied with the necessary employments and cares of the world, and who seek in the pursuit of knowledge a source of refreshment and relaxation. But the objects of its several departments are not commonly understood. The study includes the examination of the structure, habits, mode of existence, and particularly the uses of all the living beings which so thickly people the surface of the globe; and it is only in order to become acquainted with these more readily, that the naturalist arranges or classifies them, placing those together which have most in common, and separating those which are widely different. Classification (one of the most prominent divisions of this work) is not the object of Natural History, but a means of gaining that object, and it is very easy to enter upon many interesting inquiries without the slightest knowledge of it. The structure and actions of man, for example, may be examined in the greatest detail without knowing any thing of his place in the general scale of being (although such knowledge will often shorten the student's labor); and other kinds of animals may be observed in the same manner.

A second very prominent division of this work, constituting the Natural History of each individual animal under consideration, has been less brought under the notice of those who pursue this study only for the improvement and recreation of their minds, than it perhaps deserves. No one will dispute the importance of the animal world in the economy of nature, and therefore this particular department of the work will lead those who may be disposed to enter upon the study to a pursuit which cannot fail to prove an important source of interest, delight, and improvement. It is adapted as much as possible to such as have no previous information on the subject, beyond that which all persons of ordinary capacity may gain by themselves, and at the same time it omits no topic of high but less general interest, which those who feel interested in the subject may wish fully and elaborately treated.

A third and perhaps the most important division of this work is offered to supply a deficiency in this department of medical literature, upon a plan quite new and unprecedented. The student who wishes to obtain correct systematic descrip-

tions of the various substances obtained from the animal world employed in medicine, must either consult a long series of expensive books, or be content with the short notices contained in the usual treatises on the Materia Medica, and hence the important subject has been very generally neglected. The popular and expensive works now referred to undoubtedly contain much that is interesting and important on these topics; they are not, however, adapted to the general reader. They wholly confine the attention of the student to an account merely of medicinal articles, and of their composition and uses, rather than dwell particularly and at length on the analysis and history of their sources. To supply this want has been the aim of the author in the present publication, which is confined particularly to the Materia Medica *Animalia;* and the very favorable reception given by the public to his Materia Medica *Botanica*, published on the same plan, encouraged him in the undertaking.

The introduction contains a brief and general view of animal life, and a sketch of the structure and classification of the whole animal world. Occasion has been taken, in the delineation of this preliminary part of the work, to arrange under its respective order, class, and division every Beast, Bird, Fish, and Insect treated of in the work, that furnishes a substance yielding a medicinal agent. That something of this kind was necessary cannot be doubted, and the light thrown upon these subjects by this means seems preferable to incorporating the requisite additions for this purpose with each subject in the body of the work.

The Glossary, added to the other contents of the volume, contains numerous terms used in zoölogical works, and other words of frequent occurrence in, if not peculiar to, the study of Natural History. The careful definition of these terms will be esteemed as real desiderata.

The extreme difficulty and great expense of executing *the colored plates* at once in an accurate and elegant style, can only be appreciated by those who have actually attempted something of the same kind. It is gratifying, however, to find that the general execution of the plates has met with the public approbation, — a fact of which the favorable notices of the press and the large subscription list afford ample evidence, and, it is hoped, a guaranty for what may appear in future.

CONTENTS.

*** The bookbinder will be careful to place the pictures immediately in front of their respective numbers.

INTRODUCTION.

General Classification of Animals.

In order to treat clearly of the animal world, it is necessary to consider it according to some method of arrangement, by which those animals that most resemble one another are connected together for the convenience of description. This arrangement is founded upon their form and structure, and separates them into various kingdoms, divisions, classes, &c., according to their degree of similarity, and the points in which their structures correspond. Such a system of arrangement is called a classification of the animal kingdom, and as an accurate acquaintance with the principles on which it is founded is of great importance to the student of Natural History, a general view is here presented of that which is most commonly received at the present day.

In surveying the series of animals, from the lowest and most insignificant worm up to man, the lord of the creation, and examining the structure of their bodies and the mode in which they are enabled to carry on the functions of life, certain lines of distinction are observed among them, which afford ground for arranging them, in the first place, in two grand kingdoms. Those of the *first* grand kingdom are possessed of an internal skeleton, a system of bones covered by the flesh, which serves to give form, support, and strength to their whole fabric, and assist in containing the various internal organs, whose actions keep up the life and vigor of the system. Those of the *second* are not possessed of any such skeleton, but consist of a collection of organs more or less distinct, without any solid basis, and are generally of a soft, yielding texture, though occasionally covered and protected externally by a shell or other hard covering. It may be ob-

served further, that in animals of the *first* kind the blood is always red; in those of the *second* kind it is with a few exceptions white.

In those of the *first* kind, there is always a bony case, called the *cranium*, or skull, which contains the brain; and a number of bones called vertebræ, connected together so as to form a long column, usually called the spine, the backbone, or the vertebral column. This column contains a canal extending its whole length, which receives the spinal nerve or marrow, as it passes out of the skull, and conveys it along the trunk, to be thence distributed to the various parts of the body. It is, as it were, the main pillar or common support of all the rest of the skeleton; and hence the animals possessed of it are called VERTEBRAL animals, as this forms the most striking characteristic which is common to them all.

In animals of the *second* kind there is no skeleton and of course no vertebral column. The brain and nervous system are not therefore protected by any bony covering. These organs do not resemble the corresponding ones of the vertebral animals; they are less distinct and apparently less important. They have not many common points of resemblance, but as none of them possess a backbone or a skeleton, they are denominated from this circumstance *invertebral* animals, that is, without vertebræ.

The first two grand kingdoms of the animal world then are, I. Vertebrated Animals, such as man, quadrupeds, birds, fishes, &c., having a skeleton and red blood; and, II. Invertebrated Animals, such as worms, insects, shell-fish, &c., having no skeleton and white blood.

But in examining the first grand kingdom further differences are observed. Man, quadrupeds, whales, and birds have all a temperature above that of the air or water in which they reside. Their flesh is warm, and as this warmth is supposed to depend upon the temperature of the blood, they are called *warm-blooded*. On the other hand, frogs, toads, lizards, serpents, and fishes have all a temperature varying but little from that of the air or water in which they live. They impart when touched the sensation of cold. Hence they are called *cold-blooded*. Here, then, is afforded ground for a subdivision of the vertebrated animals into the warm-blooded and the cold-blooded.

Again, the warm-blooded animals are capable of being divided into two classes. A part of them produce their young alive, nourish them during infancy by their own milk from organs called their mammæ or breasts, and are hence called *Mammalia*, or *mammiferous* animals. This class includes man, quadrupeds, whales, porpoises, &c. Another part produce their young by means of eggs, which they hatch by the heat of their bodies, and support them by food, which they provide for them as soon as they come out of the egg. This class includes *birds*.

The cold-blooded vertebrated animals also form two classes. The first contains those which breathe air only, and cannot exist without it, as tortoises, frogs, serpents, &c. These are called *reptiles*. The second contains those which breathe by gills or branchiæ, through the medium of the water. This class includes all the true *fishes*, for the cetaceous animals mentioned above are not properly to be numbered among fishes.

The invertebrated animals are not capable of so satisfactory and accurate an arrangement. Their structure is not yet sufficiently understood; but they may be separated into four divisions according to such circumstances of resemblance as the present state of knowledge with regard to them admits.

The whole animal world is thus arranged into two grand kingdoms, and five distinct divisions. These are again separated into classes and subdivisions as in the following table.

I. ANIMALIA VERTEBRATA.

I. *Division.* VERTEBRATA.

Class 1. Mammalia,
2. Aves, } warm-blooded.
3. Reptilia,
4. Pisces, } cold-blooded.

II. ANIMALIA INVERTEBRATA.

II. *Division.* HETEROGANGLIATA.

Class 1. Cephalopoda.
2. Pteropoda.
3. Gasteropoda.
4. Conchifera.

Class 5. Tunicata.
6. Brachiopoda.
7. Cirrhopoda.

III. *Division.* HOMOGANGLIATA.

Class 1.	Crustacea.	Class 4.	Myriapoda.
2.	Arachnida.	5.	Annelida.
3.	Insecta.		

IV. *Division.* NEMATONEURA.

Class 1.	Echinodermata.	Class 4.	Bryozoa.
2.	Epizoa.	5.	Cœlelmintha.
3.	Rotifera.		

V. *Division.* ACRITA.

Class 1.	Sterelmintha.	Class 4.	Polypa.
2.	Acalephæ.	5.	Spongia.
3.	Polygastrica.		

After these greater divisions are distributed into classes, which will be presently described, there are several smaller divisions also, of which it will be useful and necessary to give some account.

CLASSES are subdivided into a greater or less number of ORDERS, and these are distinguished by some important, clear, and remarkable peculiarities of conformation and structure, which are common to all the animals included under each of them. Thus in the class Mammalia, the order Quadrumana includes those animals which have hands upon all four of their extremities, such as monkeys and apes; the order Ruminantia, those which ruminate or chew the cud; the order Carnivora, those adapted to feed principally on animal food. In the other classes the divisions are of a similar kind.

ORDERS are subdivided into GENERA. These comprehend animals which have a general resemblance to each other, a kind of family likeness. Thus the genus Felis includes all those of the cat kind, and these animals, although differing one from another very much in size and color, have yet a close resemblance in their general form, figure, character, and habits of life. The genus Canis includes those of the dog kind, the wolf, the fox, the jackal, and the domestic dog, of which the same remark may be made. Thus, too, the horse, the ass, and the zebra are of the same genus, Equus, on account of their obvious general similarity.

Again, GENERA are made up of SPECIES. Each distinct sort of animal constitutes a species, and they are known from

one another by the size, color, form, and various other circumstances of external appearance. There are, then, as many species as there are sorts of animals. Thus the cat is one species, the tiger is another, and the lion, leopard, jaguar, and catamount are also separate species; but taken together with others, they constitute the genus Felis. Thus, too, the genus Canis contains the dog, the wolf, the jackal, and the fox, which are all so many distinct species. The genus Sciurus contains the gray, red, striped, and several other kinds of squirrels. In treating of any particular animal, naturalists are accustomed to designate it by a name derived from its genus and species. This name is composed of two words, the first being the name of its genus, and the second being altogether arbitrary, or else expressing some circumstance, relating to the color, size, or residence of the animal, which serves in a degree to distinguish it from others. The first is called its generic, the second its trivial or specific name, and they correspond very closely to the names of human individuals, the generic terms answering to the *surname*, which designates the family to which any one belongs, and the trivial to the *Christian* name, which designates the particular individual.

To give an example: — The different species of the genus Felis, above mentioned, are distinguished one from another in the following manner. The lion is called Felis leo; the tiger, Felis tigris; the leopard, Felis leopardus; the jaguar, Felis onca; the lynx, Felis lynx; the serval, Felis serval, &c. In the genus Canis, the dog is called Canis domesticus; the wolf, Canis lupus; the black wolf, Canis lycaon; the fox, Canis vulpes, &c. In this way, each animal is capable of being clearly and accurately designated, by a name less liable to mistake and confusion than its common one, which is sometimes applied to several different species. This is called the scientific or systematic name.

Each sort of animal thus constitutes a distinct Species; a number of species taken together form a Genus; those genera which have important and well-defined points of resemblance in structure and conformation are placed together in an Order; whilst upon a similar principle, but more extensive in its application, these orders are marshalled into separate Classes; these, again, are arranged into distinct Divisions; which constitute the two grand Kingdoms of the whole animal world.

This completes a view of the animal world, beginning with man, the most perfect member of it, and descending to those obscure and minute creatures which are scarcely visible except with the assistance of the microscope. It will be observed that one common plan pervades the whole, that the same general objects are had in view, in the structure of every class, and that there is a general analogy in the methods employed for effecting these objects, although there is a great variety in the details; that there is a grand simplicity in the design, though a great diversity in the means. In short, not only in the structure of each individual animal, but in the wonderful manner in which that structure is varied to correspond to the nature, habits, and wants of the different classes, may be perceived the wisdom, the power, and the benevolence of that great Creator, who has devised and formed, and who continues to uphold, the myriads of animated beings with which the earth is filled.

Natural Classification of Medicinal Agents.

The substances employed as medicines are found, in common with the other objects of nature, everywhere surrounding us. They are prescribed either in their *natural* condition, that is, as they are found on the surface of the earth or beneath it; or as they are *artificially* prepared, that is, changed from their natural condition, either by the abstraction of some of their parts or by the addition of new parts. The natural substances consist of both simple and compound bodies, derived from the organic and inorganic kingdoms of nature. The artificial are the productions of the pharmaceutical art; thence the study of the nature of medicinal agents implies some acquaintance with Natural History and Chemical Science.

The medicinal agents which are the products of organization are of animal and of vegetable origin; the inorganic substances are minerals. The medicinal properties of organic bodies (whether animal or vegetable) vary at different periods of their existence, and owing to changes of a functional kind. In animal bodies they are most active during the exercise of some peculiar function. In vegetables they often remain latent or are not formed until the plants have attained their full growth and are capable of exercising their reproductive faculties. The medicinal properties of mineral substances (inor-

ganic bodies) are always the same, the circumstances of the habit of the patient under which they are administered being equal.

ANIMAL SUBSTANCES.

The animal substances as medicinal agents are few. As objects of Natural History, their general classification has been already stated. The respective Divisions of the two grand kingdoms will now be more particularly described.

VEGETABLE SUBSTANCES.

For these see the Family Flora, or Materia Medica Botanica, Vols. I., II., III., published on a similar plan with this work, by the same author.*

V. *Division.* ACRITA.

In animals belonging to this division no nervous filaments or masses have been discovered, and the neurine or nervous matter is supposed to be diffused in a molecular condition through the body, mixed up with the gelatinous parenchyma of which they consist. Possessing no brain or central mass

to which external impressions can be transmitted, or nervous filaments calculated to conduct sensations to distant points of the system, or associate muscular movements, they are necessarily incapable of possessing those organs which are dependent upon such circumstances: instruments of the external senses are therefore totally wanting, or their existence is at least extremely doubtful; the contractile molecules of their bodies are not as yet aggregated into muscular fibre. The alimentary apparatus consists of canals or cavities, permeating the parenchyma of the body, but without distinct walls, as in the higher divisions, where it floats in an abdominal cavity. The vascular system, where at all perceptible, consists of reticulate channels, in which the nutrient fluids move by a kind of *cyclosis*. Their mode of reproduction is likewise conformable to the diffused state of the nervous and muscular systems; not only are most of them susceptible of being multiplied by mechanical division, but they generate by spontaneous fissure, as well as by gemmæ, ciliated gemmules, and true ova. Many appear to be made up of a repetition of similar parts, forming compound animals of various forms, and different degrees of complexity.

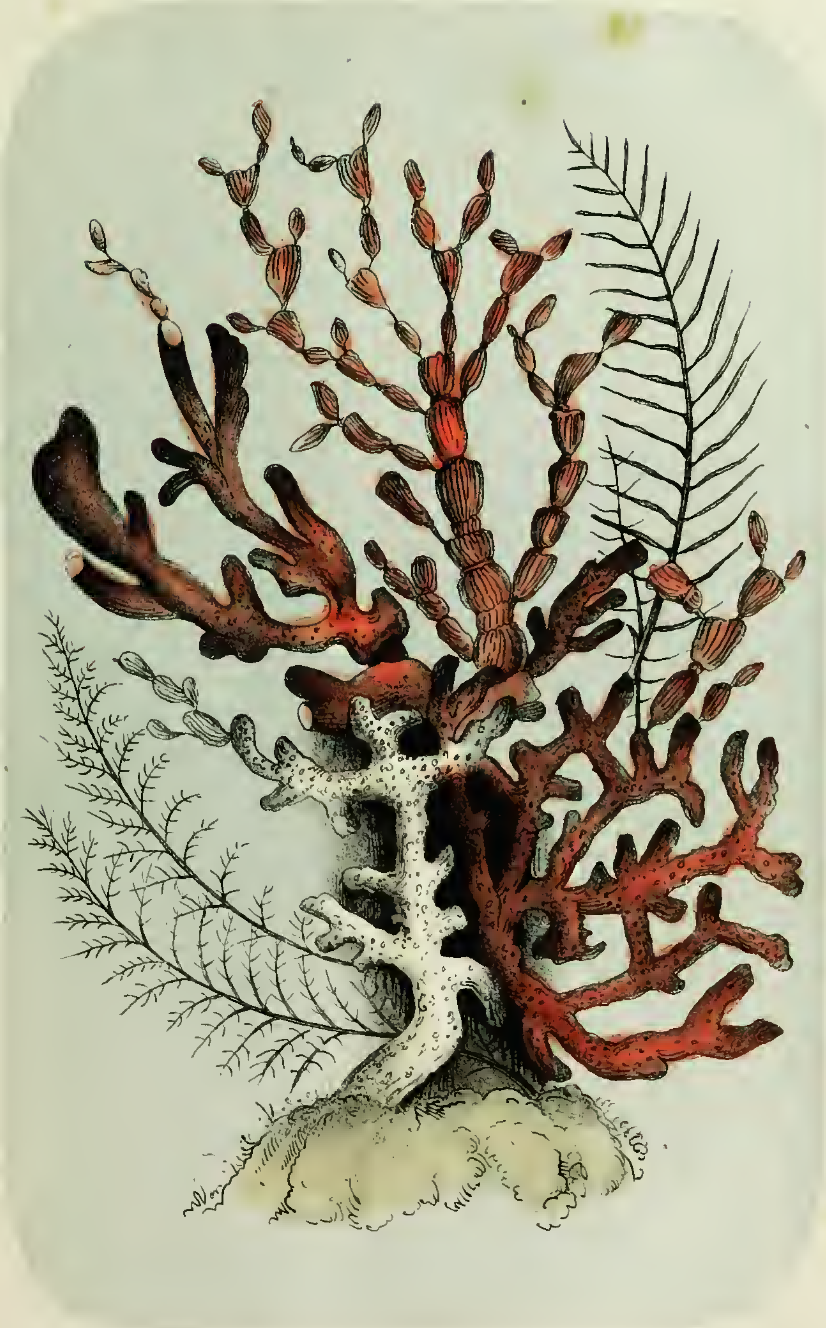
The only animal substance yielding a medicinal agent obtained from this Division of the animal world is from

Class 5. The Spongia.

Spongia officinalis, *the Sponge*. The No. 1 of this work.

Isis nobilis, *the Coral*, is now rejected from the list of the Materia Medica, and forms no No. of this work.*

* Isis nobilis, *the Coral*. A substance found at the bottom of the Mediterranean and other seas, formerly considered as a plant, but now universally admitted to belong to the animal kingdom. The *red coral* (*Corallium rubrum* of Lamarck, *Isis nobilis* of Linn.) is in the form of a small shrub, a foot or two in height, with a stem sometimes an inch or two in thickness, fixed to the rock by an expansion of the base, divided above into branches, and covered with a pulpy membrane, which is properly the living part, and which is removed when the coral is collected. The central portion is extremely hard, of various shades of red, susceptible of a brilliant polish, longitudinally striated, and formed of concentric layers, which are rendered obvious by calcination. Its chief constituent is carbonate of lime, which is colored by oxide of iron, and united, as in similar calcareous products, with more or less animal matter. It was formerly very highly valued as a remedy, but is in no respect superior to prepared oyster-shell, or other forms of carbonate of lime, derived from the animal kingdom. It was employed in the form of fine powder, or in different preparations, such as troches, sirups, conserves, tinctures, &c. At present it is valued chiefly as an ornament.



Lith of E C Kellogg · Hartford Conn

N° 22.

ISIS NOBILIS,

The Coral.

IV. *Division.* Nematoneura.

In the second division of the Radiata of Cuvier, the nervous matter is distinctly aggregated into filaments, and in some cases nuclei of neurine, which may be regarded as rudimentary nervous centres, have been noticed. It is to be lamented, however, that in this most interesting group of animals, in which is the first development of most of the organs subservient to the vital functions, the extreme minuteness of some genera, and the difficulty of distinctly observing the nervous system in the larger species, have prevented our knowledge regarding their organization, in this particular, from being of that satisfactory character to which it may hereafter attain.

Owing to the want or imperfect condition of the nervous centres, the Nematoneura are necessarily incapable of possessing external organs of the higher senses, the general sense of touch being as yet the only one of which they are indubitably possessed. Yet in their muscular system they are much more efficiently provided than the Acrite orders, as the development of nervous threads of communication renders an association of muscular actions possible; and therefore, co-apparent with nervous filaments, are distinguished in the structure of the Nematoneura distinct fasciculi of muscular fibre, and powers of locomotion of a much more perfect description.

The digestive apparatus is no longer composed of canals merely excavated in the parenchyma of the body, but is provided with distinct muscular and membranous walls, and loosely attached in an abdominal cavity.

The circulation of the nutritious fluid is likewise carried on in a separate system of vessels, distinct from the alimentary apparatus, yet still unprovided with a heart or exhibiting pulsations for the forcible impulsion of the contained blood.

The fissiparous mode of reproduction is no longer witnessed, an obvious consequence of the increased complexity of structure, and these animals are for the most part androgynous, or capable of producing fertile ova, without the coöperation of two individuals.

It will be perceived, that this division, however well separated from the preceding by physiological characters, is, in a zoölogical point of view, principally composed of groups detached from the members of other orders. The Bryozoa are evidently dismemberments of the family of Polyps, from which

they differ in their more elaborate internal organization. The Cœlemintha are more perfect forms of the Parenchymatous Entozoa. The Rotifera, formerly confounded with the Infusoria, exhibit manifest analogies with the articulated Crustaceans, as in fact do the Epizoa. The Echinodermata alone appear to form an isolated group, properly belonging to the division under consideration.

No animal substance yielding a medicinal agent is obtained from this division of the animal world.

III. *Division.* Homogangliata.

The Articulated division of the animal world is characterized by a nervous system, much superior in development to that possessed by the two preceding, indicated by the superior proportionate size which the ganglionic centres bear to the nerves which emanate from them. The presence of these central masses of neurine admits of the possession of external senses of a higher class than might be expected among the Acrita or Nematoneura, and gives rise to a concentration of nervous power, which allows of the existence of external limbs of various kinds, and of a complex muscular system, capable of great energy and power of action.

The nervous centres are arranged in two parallel lines along the whole length of the body, forming a series of double ganglia or brains belonging apparently to the individual segments of which the animal is composed. The anterior pair, placed invariably in the head above the œsophagus, and consequently upon the dorsal aspect of the body, seems more immediately appropriated to the higher senses, supplying nerves to the antennæ or more special instruments of touch, to the eyes, which now manifest much complexity of structure, to the auditory apparatus where such exists, and probably to the senses of taste and smell. This dorsal or anterior pair of ganglia, which evidently is in relation with the higher functions of the economy of the creature, is brought into communication with the series of nervous centres placed along the ventral aspect, by means of filaments which embrace the œsophagus, and joins the anterior pair placed beneath it; the whole system may therefore be regarded as a series of independent brains destined to animate the segments of the body in which they are individually placed. Such a multiplication of the central organs of the nervous

system is obviously adapted to the elongated forms of the vermiform orders, but, from the want of concentration which such an arrangement implies, this type of structure is still very inferior in its character. As the Articulata become more perfect in their outward form, the number of the brains becomes diminished, while their proportionate size increases; and thus in the carnivorous insects, Arachnida and Crustacea, they are all united into a few great masses, which, becoming the general centres of the entire system, admit of a perfection in their external senses, a precision in their movements, and an energy of action, of which the detached character of the ganglia in the lower tribes was incapable.

This dependence of the perfection of the animal upon the concentration of the central masses of the nervous system is strikingly proved by the changes perceptible in the number and arrangement of the ganglia, during the progress of an insect through the different stages of its existence. In the elongated body of the worm-like caterpillar each segment possesses its appropriate pair of ganglia, and the consequence of such diffusion of its nervous apparatus is apparent in its imperfect limbs, its rude organs of sense, its sluggish movements, and general apathy; but as it successively attains to more mature forms of existence, passing through the different metamorphoses which it undergoes, the nervous ganglia gradually coalesce, increase in power as they diminish in number, until, in the imago or perfect state, having arrived at the greatest concentration compatible with the habits of the insect, it is endued with new and far more exalted attributes, the organs of its senses are more elaborately formed, it possesses limbs which previously it would have been utterly incapable of wielding, its movements are characterized by their activity and precision, and its instincts and capabilities proportionately enlarged and exalted.

The Homogangliate division of the animal world is extremely natural. Four classes of this division furnish animal substances yielding medicinal agents.

Class 1. The Crustacea, yields

ASTACUS FLUVIATILIS, *the Cray-fish*, not much used.*

* Concretions are formed in the stomach of this fish, just before the shell is cast. They consist chiefly of carbonate of lime, and were formerly employed as antacids, but they are now seldom used, and consequently this fish forms no No. of this work.

Class 2. The Arachnida, yields

TEGENERIA MEDICINALIS, *the Spider.* The No. 20 of this work.

Class 3. The Insecta, yields

CANTHARIS VESICATORIA, *the Spanish Fly.* The No. 5 of this work.

APIS MELLIFICA, *the Honey-bee.* The No. 6 of this work.

COCCUS CACTI, *the Cochineal insect.* The No. 10 of this work.

CYNIPS QUERCUS FOLII, *the Gall insect.* The No. 15 of this work.

Class 5. The Annelida, yields

SANGUISUGA, *Blood-sucking Leeches.* The No. 17 of this work.

ANNELIDA TERRICOLA, *Earth-worms.* The No. 23 of this work, not considered officinal.

II. *Division.* HETEROGANGLIATA.

The characters of this division are well defined, and the irregular and unsymmetrical forms of the bodies of most of the genera which compose it, in exact relation with the arrangement of the nervous apparatus.

As in the Articulata, there is a large nervous mass placed above the œsophagus, which supplies the principal organs of sense, but the other ganglia are variously dispersed through the body, although always brought into communication with the supra-œsophageal portion by connecting filaments. Throughout all the forms is found a distinct relation between the size and development of the nervous centres and the perfection of the animal, indicated by the senses and organs of motion with which it is provided.

Three classes of this division furnish each an animal substance yielding a medicinal agent.

Class 1. The Cephalopoda, yields

SEPIA OFFICINALIS, *the Cuttle-fish.* The No. 18 of this work.

Class 3. The Gasteropoda, yields

HELIX POMATIA, *the Snail.* The No. 19 of this work.

Class 4. The Conchifera, yields

OSTREA EDULIS, *the common Edible Oyster.* The No. 14 of this work.

I. *Division.* Vertebrata.

The arrangement of the nervous centres in the highest or Vertebrate division indicates the greatest possible concentration and development. The ganglionic masses assume a very great proportionate size when compared with the nerves which emanate from them, and are principally united into a long chain denominated the cerebro-spinal axis or cord, which is inclosed in a cartilaginous or bony canal occupying the dorsal region of the animal. The anterior extremity of the cerebro-spinal axis is made up of those ganglia which are more especially in relation with the principal senses and the higher powers of intelligence, forming a mass denominated, from its position in the skull which incloses it, the *encephalon.* It is with the increased proportionate development of this portion that the intelligence of the animal becomes augmented; in the lower tribes the cerebral masses scarcely exceed in size those which form the rest of the central chain of ganglia. but in advancing from fishes towards the higher forms of the Vertebrata, they are observed to preponderate more and more in bulk, until at last in man they assume that extraordinary development adapted to the exalted position which he is destined to occupy. It is in the cerebral ganglia, therefore, that is found the representative of the supra-œsophageal masses of the articulated and molluscous classes, which, as already observed, preside especially over the senses, and correspond in their proportions with the capabilities of the tribes of animals included in those divisions. The spinal cord, as the rest of the central axis of the nervous system of Vertebrata is denominated, is made up of a succession of ganglia, in communication with symmetrical pairs of nerves connected with them, and which preside over the generally diffused sense of touch and the voluntary motions of the body. But besides the cerebro-spinal system, there is in the vertebrated classes another set of nervous centres to which nothing corresponding has been satisfactorily identified in the lower divisions; namely, *the sympathetic system*, which mainly controls the involuntary movements of the body connected with the vital functions.

The *Vertebrata* are further distinguished by the possession of an internal organized skeleton, composed of either cartilage or bone, made up of several pieces, serving to support the frame. and forming a series of levers upon which the muscles act.

All the classes of this division furnish animal substances yielding medicinal agents.

Class 1. The Mammalia, yields

Bos taurus, *the Ox and Cow.* The No. 3 of this work.

Moschus moschiferus, *the Musk animal.* The No. 7 of this work.

Physeter macrocephalus, *the Spermaceti Whale.* The No. 8 of this work.

Sus scrofa, *the Hog.* The No. 9 of this work.

Castor fiber, *the Castor Beaver.* The No. 11 of this work.

Viverra civetta, *the Civet Cat.* The No. 12 of this work.

Ovis aries, *the Sheep.* The No. 13 of this work.

Corvus elaphus, *the Stag.* The No. 16 of this work.

Class 2. The Aves, yields

Gallus domesticus, *the Domestic Cock and Hen.* The No. 2 of this work.

Class 3. The Reptilia, yields

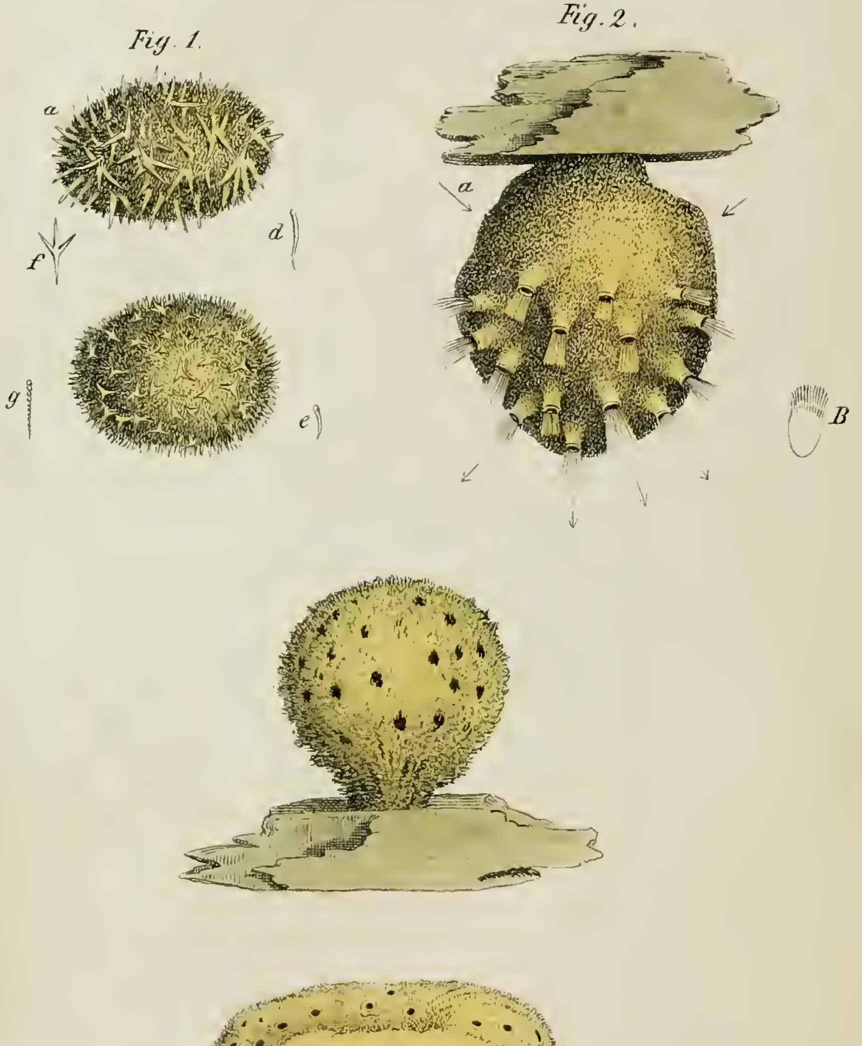
Crotalus horridus, *the Rattlesnake.* The No. 24 of this work, not considered officinal.

Class 4. The Pisces, yields

Gadus morrhua, *the Common Cod.* The No. 4 of this work.

Acipenser huso, *the Sturgeon.* The No. 21 of this work.

Thus are represented all the substances of the animal world that yield medicinal agents and perfect the Materia Medica Animalia. It would be easy to dilate on the uses and advantages to be derived from an acquaintance with this branch of Natural History, nor would it be difficult to show how much that is bright and beautiful in Nature is for ever lost to him who has never become conversant with the study. No part can be viewed as unimportant or uninteresting; none is unworthy of the most attentive consideration, or can fail to impress the mind with feelings of profound admiration for the works of Nature. Marvellous indeed as they are all, the most astounding manifestations of Supreme Intelligence are unquestionably displayed in his character as "Lord and Giver of Life," as the Creator and Preserver of all that "*live, move, and have their being.*"



E. C. Kellogg. Hartford, Conn.

Nº 1.

SPONGIA OFFICINALIS.

Sponge.

MATERIA MEDICA ANIMALIA.

ACRITA.

Zoöphytes, or Radiated Animals.

No. 1.

SPONGIA OFFICINALIS.

SPONGE.

The animal substance. A medicinal agent.

Geog. Position. Mediterranean and Red Seas.

Quality. Soft, porous, elastic.

Power. Stimulant, resolvent.

Use. Surgical operations, and for checking hemorrhage. Scrofulous complaints and bronchocele.

SCIENTIFIC ANALYSIS.

Natural Classification.

1. Division *Acrita.* Class *Spongia.*

Ballard and Garrod, Mat. Med. 464. Ec. Disp. U. S. 389. Jones's An. King. 12. Pereira, Mat. Med. II. 767. Lond. Disp. 601. Syst. Nat. Gmelin, VI. 3817. Thomson, Mat. Med. 75* U. S. Disp. 704.

Genus SPONGIA.

Σπογγία (Gr.), éponge (Fr.), spugna (It.), esponja (Sp.), spongea (Sax.), spons (Dan.), Meerschwamm, Saugschwamm (G.), Spongie (Dutch), Bodiaga (Russ.), Isfunj (Arab.), Mo-abadul (Hind.), Abeermoordele (Pers.), Uniwatta (Jap.).

The Essential Characters.

Nervous System none, the nervous matter diffused in a molecular condition through the body.

Brain or central mass none; *organs of sense*, or any circular glandular organs, totally wanting.

Body composed of a soft, gelatinous flesh, traversed internally with numerous ramose anastomosing canals, which commence from superficial minute *pores* and terminate in larger open *vents.*

Mode of reproduction by mechanical divisions, and by germs or gemmules.

The Secondary Characters.

Spongia. *Body* soft, very elastic, multiform, more or less irregular, very porous, traversed by numerous tortuous canals which open externally by very distinct vents (*oscula*), and composed of a kind of subcartilaginous *skeleton*, anastomosed in every direction, and entirely without spicules.

The Specific Characters.

Spongia officinalis. *Masses* very large, flattened and slightly convex above, soft, tenacious, coarsely porous, cracked, and lacunose, especially beneath. *Vents* sound, and for the most part large.

NATURAL HISTORY.

The great circles to which the animal and vegetable kingdoms are compared, like the smaller circles, touch each other; that is, there are certain forms of organization so closely allied to both, that it is difficult to say precisely in which they ought to be included. Such are the sponges, which, although by common consent admitted into the animal series, will be found to be excluded, by almost every point of their structure, from all the definitions of an animal hitherto given. The concise axiom of Linnæus upon this subject is well known: — "Stones grow, vegetables grow and live, animals grow, live, and feel." The capability of feeling, therefore, formed in the opinion of Linnæus the great characteristic separating the animal from the vegetable kingdom; yet in the class under consideration, no indication of sensation has been witnessed; contact, however rude, excites no movement or contraction, which might indicate its being perceived; no torture has ever elicited from them an intimation of suffering. Sponges have been pinched with forceps, lacerated in all directions, bored with hot irons, and attacked with the most energetic chemical stimuli, without shrinking or exhibiting the remotest appearance of sensibility. On the other hand, in the vegetable world there are plants which apparently feel, in this sense of the word. The sensitive plant, for example, which droops its leaves upon the slightest touch, has far greater claims to be considered animal than the sponges of which we are writing.

The power of voluntary motion has been appealed to as exclusively belonging to the animal economy; yet, setting aside the spontaneous movements of some vegetables, the

sponge, rooted to the rock, seems absolutely incapable of this function, and the most microscopic scrutiny has failed to detect its existence.

The best definition of an animal, as distinguished from a vegetable, which has as yet been given, is, that whereas the latter, fixed in the soil by roots, or immersed perpetually in the fluid from which it derives its nourishment, absorbs by its whole surface the nutriment which it requires; the animal, being generally in a greater or less degree capable of changing its position, is provided with an internal receptacle for food, or stomachal cavity, from which, after undergoing the process of digestion, the nutritious matter is taken up. But in the case of the sponge no such reservoir is found; and in its place are only anastomosing canals which permeate the whole body, and convey the circumambient medium to all parts of the porous mass.

Another circumstance which specially appertains to the animal kingdom is derived from the chemical composition of organized bodies. Vegetables contain but a small proportion of azote in their substance, whilst in animals this element exists in considerable abundance, causing their tissues, when burned, to give out a peculiar odor, resembling that of burned horn, and in this particular sponges differ from vegetable matter. The discoveries of Mr. Bowerbank appear conclusive as to its animality. In one species of the sponge he detects a branched vascular system, with globules in the vessels analogous to the circular blood disks of the higher animals. Nothing analogous to this has hitherto been detected in plants.

The common sponge of commerce is made up of horny, elastic fibres of great delicacy, united with each other in every possible direction, so as to form innumerable canals, which traverse its substance in all directions. To this structure the sponge owes its useful properties, the resiliency of the fibres composing it making them, after compression, return to their former state, and leaving the canals which they form open, to suck up surrounding fluids by capillary attraction.

The dried sponge is, however, only the skeleton of the living animal; in its original state, before it was withdrawn from its native element, every filament of its substance was coated over with a thin film of glairy semifluid matter, composed of aggregated transparent globules, which was the living part of the sponge, secreting, as it extended itself, the horny fibres

which are embedded in it. The anastomosing filaments which compose the skeleton of such sponges, when examined under a microscope and highly magnified, appear to be tabular, as represented Plate I. Fig. 1, *c*.

Many species, although exhibiting the same porous structure, have none of the elasticity of the officinal sponge, a circumstance which is due to the difference observable in the composition of their skeletons or ramified framework. In such the living crust forms within its substance, not only tenacious bands of animal matter, but great quantities of crystallized spicula, sometimes of a calcareous, at others of a silicious nature, which are united together by the tenacity of the fibres with which they are surrounded. On destroying the softer portions of these skeletons, either by the aid of a blowpipe or by the caustic acids or alkalies, the spicula remain, and may readily be examined under a microscope; they are then seen to have determinate forms, which are generally in relation with the natural crystals of the earths of which they consist; and as the shape of the spicula is found to be similar in all sponges of the same species, and not unfrequently peculiar to each, these minute particles become of use in the identification of these bodies.

Crystallized spicula of this description form a feature in the structure of the sponge which is common to that of many vegetables, resembling the formations called *Raphides* by botanical writers. Some of the principal forms which they exhibit are depicted Plate I. Fig. 1, *a*, *b*, which likewise will give the reader a general idea of the appearance of the silicious and calcareous sponges, after the destruction of their soft parts has been effected by the means above indicated. The figures, Plate I. *d*, *e*, *f*, and *g*, exhibit detached spicula of different forms, highly magnified. The most convenient method of seeing them is simply to scrape off a few particles from the incinerated sponge upon a piece of glass, which, when placed under the microscope, may be examined with ordinary powers.

On placing a living sponge of small size in a watch-glass, or small glass trough filled with sea-water, and watching it attentively, something like a vital action becomes apparent. The entire surface is seen to be perforated by innumerable pores and apertures, some exceedingly minute, opening on every part of its periphery; others of larger dimensions, placed

at intervals, and generally elevated upon prominent portions of the sponge. Through the smaller orifices the surrounding water is continually sucked, as it were, into the interior of the spongy mass, and it as constantly flows out in continuous streams through the larger openings. This continual influx and efflux of the surrounding fluid is produced by an agency not yet discovered, as no contraction of the walls of the canals, or other cause to which the movement may be referred, has ever been detected. It is certain, however, that it is from the currents thus continually permeating every portion of its substance, that the general mass is nourished. The diagram, Plate I. Fig. 2, *a*, will give an idea of the most usual direction of the streams; the entering fluid rushes in at the countless pores which occupy the body of the sponge, but, in its progress through the canals in the interior, becomes directed into more capacious channels, communicating with the prominent larger orifices, through which it is ultimately ejected in equable and ceaseless currents. Organized particles, which necessarily abound in the water of the ocean, are thus introduced into the sponge on all sides, and are probably employed as nutriment, whilst the superfluous or effete matter is continually cast out with the issuing streams as they rush through the fecal orifices. The growth of the sponge is thus provided for, the living gelatinous portion continually accumulates, and, as it spreads in every direction, secretes and deposits, in the form peculiar to its species, the fibrous material and earthy spicula which characterize the skeleton.

From this description of the structure of a sponge, it will be apparent that all parts of the mass are similarly organized; a necessary consequence will be, that each part is able to carry on, independently of the rest, those functions needful for existence. If, therefore, a sponge be mechanically divided into several pieces, every portion becomes a distinct animal.

The multiplication of sponges, however, is effected in another manner, which is the ordinary mode of their reproduction, and forms a very interesting portion of their history. At certain seasons of the year, if a living sponge be cut to pieces, the channels in its interior are found to have their walls studded with yellowish gelatinous granules developed in the living parenchyma which lines them. These granules are the germs or gemmules from which a future race will spring; they seem to be formed indifferently in all parts of the mass,

sprouting as it were from the albuminous crust which coats the skeleton, without the appearance of any organs appropriated to their development. As they increase in size, they are found to project more and more into the canals which ramify through the sponge, and to be provided with an apparatus of locomotion of a description which will be frequently noticed. The gemmule assumes an ovoid form, Plate I. Fig. 2, B, and a large portion of its surface becomes covered with innumerable vibrating hairs or cilia, as they are denominated, which are of inconceivable minuteness, yet individually capable of exercising rapid movements which produce currents in the surrounding fluid. As soon, therefore, as a gemmule is sufficiently mature, it becomes detached from the nidus where it was formed, and, whirled along by the issuing streams which are expelled through the fecal orifices of the parent, it escapes into the water around. Instead, however, of falling to the bottom, as so apparently helpless a particle of jelly might be expected to do, the ceaseless vibration of the cilia upon its surface propels it rapidly along, until, being removed to a considerable distance from its original, it attaches itself to a proper object, and, losing the locomotive cilia which it at first possessed, becomes fixed and motionless, and develops within its substance the skeleton peculiar to its species, exhibiting by degrees the form of the individual from which it sprung. It is curious to observe the remarkable exception which sponges exhibit to the usual phenomena witnessed in the reproduction of animals, the object of which is evident, as the result is admirable. The parent sponge, deprived of all power of movement, would obviously be incapable of dispersing to a distance the numerous progeny which it furnishes; they must inevitably have accumulated in the immediate vicinity of their place of birth, without the possibility of their distribution to other localities. The seeds of vegetables, sometimes winged and plumed for the purpose, are blown about by the winds, or transported by various agencies to distant places; but in the present instance, the still waters in which sponges grow would not have served to transport their progeny elsewhere, and germs so soft and delicate could hardly be removed by other creatures. Instead, therefore, of being helpless at their birth, the young sponges can, by means of their cilia, row themselves about at pleasure, and enjoy for a period powers of locomotion denied to their adult state.

Sponge is found chiefly in the Mediterranean and Red Seas. In some of the islands of the Archipelago the inhabitants are trained from infancy to dive for sponges, which are generally found attached to the bottom of rocks, to which they adhere by a very broad base. When the sponge is brought on shore, it is immediately squeezed and washed to get rid of the gelatinous matters; otherwise putrefaction speedily ensues.

In commerce two kinds of sponge are met with, which are respectively known as Turkey and West-Indian.

The Turkey sponge is imported from Smyrna, and is considered the best. It occurs in cup-shaped masses of various size. Its texture is much finer than the West-Indian kind. By the aid of the microscope, it has been discovered that it consists of two species of Spongia, not distinguishable from each other by the naked eye. One of these is characterized by the presence of a beautiful branched vascular tissue, which surrounds, in great abundance, nearly every fibre of its structure, and is inclosed in an external membrane or sheath. In the other, and most common, kind of Turkey sponge, no vascular tissue has yet been discovered.

The West-Indian sponge is found in the Bahama Islands, whence it is commonly known as *Bahama sponge.* Its forms are more or less convex, with projecting lobes. Its fibre is coarser. Its tissue has but little cohesion, and hence this kind of sponge is commonly regarded as rotten. It consists of one species only of Spongia.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Sponge when first taken out of the sea has a strong fishy odor. Its color varies from pale to deep brownish-yellow. It often contains stony or earthy concretions, which are found to consist principally of the carbonates of lime and magnesia. Shells are also found in sponge. Various marine animals pierce and gnaw it into irregular holes.

Spongia officinalis is the dry skeleton of the animal, from which the gelatinous flesh has been removed. When deprived of stony concretions, &c., found in the interior of the mass, it is soft, light, flexible, and compressible. When burnt, it evolves an animal odor. It absorbs water, and thereby swells up. Nitric acid colors it yellow. Liquor potassæ dissolves it. The solution forms a precipitate on the addition

of an acid. The finer sponges, which have the greatest firmness and tenacity, were formerly called male sponge, while the coarser portions were denominated female sponge.

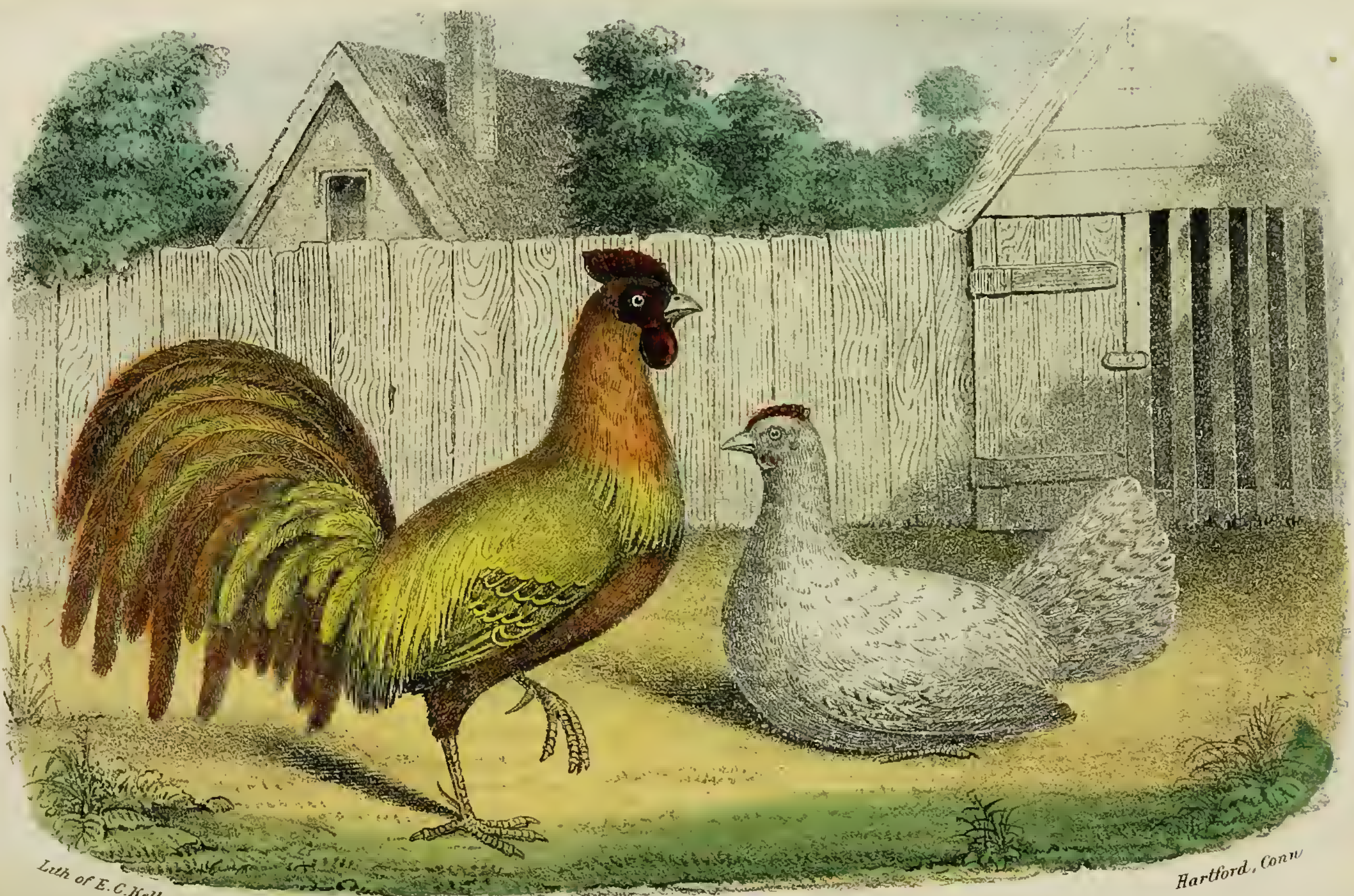
Well-washed sponge, freed as much as possible from earths and salts by dilute acids, is found to consist of *a substance similar to osmazome, animal mucus, fat oil, a substance soluble in water, a substance only soluble in potash, and traces of chloride of sodium, iodine, sulphur, phosphate of lime, silica, alumina, and magnesia.* Sponge also consists of *gelatine* (which it gradually gives out to water), and a thin, brittle, membranous substance, which possesses the properties of *coagulated albumen.*

The extensive economical uses of sponge are well known. To the surgeon it is of great value on account of its softness, porosity, elasticity, and the facility with which it imbibes fluids. Its use in surgical operations and for checking hemorrhage is universal. It has also been applied to wounds and ulcers for imbibing acrid discharges. The *sponge-tent* is usually made of compressed sponge impregnated with wax (*Spongia cerata*), and which is called *prepared sponge* (*Spongia præparata*). It is prepared by dipping sponge into melted wax, and compressing it between two iron plates till the wax hardens. It was formerly much resorted to for dilating sinuses and small openings, but it is now seldom used.

Spongia usta. *Calcined or burnt sponge.* Cut sponge into small pieces and bruise it, in order to free it from any adhering extraneous substances; then burn it in a covered iron vessel, until it becomes black and friable; finally, rub it to a very fine powder.

The properties of burnt sponge consist of carbonate and phosphate of lime, subcarbonate of soda, iodine, and charcoal. The active ingredients are the subcarbonate of soda and the iodine.

Burnt sponge is tonic, deobstruent, and antacid. It has been much recommended in bronchocele, scrofulous affections, and herpetic eruptions. It has also been used with considerable effect in scirrhous testicle, when given in combination with cinchona bark. It is supposed to derive its efficacy from the iodine it contains. The dose is from one to three drachms, mixed into the form of an electuary, with powdered cinnamon and honey. In bronchocele the patient is directed to swallow the portion of electuary very slowly, from a supposition that some local effect is produced.



Lith of E. C. Kellogg. Hartford, Conn

No. 2.

GALLUS DOMESTICUS.

The domestic Cock and Hen

VERTEBRATA.

Vertebrated Animals.

No. 2.

GALLUS DOMESTICUS.

THE DOMESTIC COCK AND HEN.

The animal substance. *Ovum*, *Egg*. A medicinal agent.

Geog. Position. Domesticated everywhere.

Quality. Inodorous, nutritive.

Power. Emollient, demulcent.

Use. The white to clarify fluids. The yellow to suspend camphor and resins in emulsion. The shell as an absorbent. The oil as an emollient.

SCIENTIFIC ANALYSIS.

Natural Classification.

5. Division *Vertebrata.* Class *Aves.*

Ballard and Garrod, Mat. Med. 452. Ec. Disp. U. S. 289. Pereira, Mat. Med. II. 806. Lond. Disp. 489. Syst. Nat. Gmelin, I. 737. Willd. Ornith. 154, t. 26. Thomson, Mat. Med. 70. U. S. Disp. 546.

Genus GALLUS.

Œuf (Fr.) Ei (G.), Uovo (It.), Huevo (Sp.), Eij (Dutch), Aeg (Dan.), Agg (Swed.), Ovo (Port.), Jaizo (Russ.), Jaie (Poln.), Wegee (Bohem.), Muna (Finl.), Monne (Lapl.), Jemurda (Turk.), Tochem (Pers.), Mennik (Greenl.), Manning (Esquimaux), Mootay (Tam.), Anda (Sans.), Gubbel (Bornouese).

The Essential Characters.

Blood red and warm, respiring by lungs.

Body covered with feathers, and general conformation organized for flying.

Bill short, convex, in some genera covered by a *cere.* Upper *mandible* bending from its base, or only at the point. Nostrils internal, covered by a membrane naked or feathered.

Tarsus long. Three toes before united at their base by a membrane; hind *toe* articulated on the tarsus above the junction of the anterior toes.

Mode of reproduction, from eggs.

The Secondary Characters.

Gallus. *Bill* of medium size, strong, base naked. *Upper*

mandible arched, convex, bent towards the point. *Head* surmounted by a crest or plume. *Ears* naked. Three *toes* before, united to the first joint. The hind *toe* raised from the ground. *Tarsus* with a long and bent spur. Middle *feathers* of the tail arched. *Wings* short.

THE SPECIFIC CHARACTERS.

GALLUS DOMESTICUS. *Comb* dentated. *Throat* wattled. *Feathers* of the neck linear and elongated. *Body* variegated with beautiful colors. *Tail* compressed and ascending. *Comb and wattles* of the female less than those of the male.

NATURAL HISTORY.

The Cock and Hen, fowls or poultry, were originally natives of Persia and India. They are most valuable to the farmer, as yielding profit in eggs, broods, and feathers. The varieties of the common fowl are very numerous, and are distinguished from one another by their size, color, and fecundity. Fowls should be kept very clean and dry, and particular care must be taken to furnish them with clean, sweet water; foul water produces that fatal disorder among chickens called roup, or gapes, which is known by the chicken gasping for breath, and dying in a few hours. No remedy has yet been discovered for this disorder; and, consequently, care and cleanliness should prevent it. Foul water and a scarcity of water are also causes of the pip in hens, and originate all their diseases. Poultry of all sorts should have clean, sweet houses to retire into during the night, and in seasons of wet. Warmth is necessary to the comfort and well-doing of poultry. If hens are kept with care, and have clean, quiet places to deposit themselves in, they will lay regularly and repay all trouble. One cock is sufficient for ten hens. He should be chosen with care. A good cock should be well-sized, carrying his head high; he should have a quick, animated look, a strong, shrill voice, the comb of a fine red, broad breast, strong wings, legs thick, and his bill thick and short. The vigor of the cock lasts three years; he must then be superseded, and a fine, spirited youthful successor installed in his room. A cock is at full age at three months old. Three sorts of hens are useful. The *common hen*, whose proper signs should be a large head, bluish feet, sharp eyes, and pendant comb. The *tufted hen*, for eating, as she does not lay much, and therefore fat-

tens well. And the large white *Dorking breed*, which is always considered the most valuable, and always fetches the highest price in the market. The Dorking fowls are distinguished by having five claws on each foot. Equal to the Dorking in estimation some consider the Poland fowls. Their color is black, their head flat, and surmounted with a crown of feathers. They are a very useful variety, prolific of eggs, but less inclined to set than those of any other breed. All others are kept more for show and fancy than for use. The Bantam is a little Indian breed, very delicate to eat, but from the smallness of its size not of any economical importance.

The Chittagong or Malay fowl is the largest breed that has been brought either to Europe or America, but the flesh is regarded as inferior to that of the Dorking or Poland. Fowls should not be allowed to wander much; they lay better and more regularly when confined to their own yards. Their food should be given with great regularity at sunrise and sunset, and they should be fed under cover during rain or high winds. During harvest their portion of food is always diminished. All sorts of pot herbs boiled in the washings of dishes, mixed with bran, and then drained, is excellent, the paste warmed up as required, while sweet. Well-boiled mealy potatoes, buckwheat, barley, whole or ground, refuse of fruit, bread, offal from the kitchen, &c., is taken greedily. But all their food should be fresh of its kind.

The laying-time begins about March. A hen gives notice of her intention by being busy and restless, and *talking to herself* for some time, and her comb becomes very red. Her cackling soon gives notice that the deed is done. Let her have a dark, quiet box to lay in. The moulting season begins in autumn, when the hen ceases to lay for some time; the whole feathered tribe are then drooping and dull, till the new feathers have replaced the old ones. A hen is old at four years of age; for three years she is valuable, and in her fourth year she must make way for younger birds. A hen sets three weeks. Her disposition to set is soon discovered by her placing herself upon any eggs she can find, and remaining thereon instead of roosting. She should be placed upon fresh eggs, unless allowed to sit as nature directs upon her own natural number, — which rarely exceeds eighteen; but if one egg alone is allowed to remain in the nest, she will continue to lay many more before she wishes to set. If the brood is hatched irreg-

ularly, the firstlings should be kept in flannel, near a fire, all day, till the others come forth; but they should be returned to the mother at night. The hen and her brood should be kept warm, and be cooped out of doors only in dry, fine weather. They should be fed for some days on bread-crumbs, with some finely-chopped leeks, and be carefully supplied with clear, clean water daily. Boiled barley, and boiled rice, &c., succeeds, till in about three weeks they are sufficiently strong to be turned into the poultry-yard. When the young chickens get their head feathers, they are out of danger of all infantine disorders. Nothing is so requisite for all poultry as warmth, cleanliness, and good water. They should never be allowed to roost in stables, or kept near cattle, as they communicate their vermin to these, which worries and prevents them from growing fat. Every poultry-yard should have a bed of ashes deposited in a corner, the fowls delight in a dung-hill and an ash-hole; the former produces seeds and insects, and the latter calcareous matter, and destroys their vermin by its sharpness, as they revel in its rough particles. Fowls to be fattened for the table should be put into coops for a fortnight or three weeks, and fed upon good barley-meal moistened with milk or water and lard. Give it four or five times per day, sufficiently moist to require no drink with the food.

The changes which the hen's egg undergoes during incubation have been described by Sir E. Home, in the Philosophical Transactions for the Year 1822 (page 339), and illustrated by a beautiful series of plates, after Banner's drawings; the same volume also contains a valuable paper by Dr. Prout on the same subject, but chiefly in reference to the chemical changes of the egg during that process. The specific gravity of new-laid eggs at first rather exceeds that of water, varying from 1080 to 1090; but they soon become lighter, and swim on water, in consequence of evaporation through the pores of the shell. When an egg is boiled in water and suffered to cool in the air, it looses about 32 hundredths of a grain of saline matter, together with a trace of animal matter, and free alkali. The mean weight of a hen's egg is about 875 grains, of which the shell and its inner membrane weigh 93.7 grains, the albumen or white 529.8 grains, and the yelk 251.8 grains. When the yelk of a hard-boiled egg is digested in repeated portions of strong alcohol, there remains a white

residue having the leading characters of albumen, but containing phosphorus in some peculiar state of combination; the alcoholic solution is yellow, and deposits a crystalline, fatty matter, and when distilled leaves a yellow oil. The use of the phosphorus is to yield phosphoric acid to form the bones of the chick, but the source of the lime with which it is combined is not apparent, for it has not been detected in the soft parts of the egg, and hitherto no vascular communication has been discovered between the chick and the shell.

The shell of the egg is lined throughout with a thin but tough membrane, called *pellicula ovi*, which, dividing at or near the obtuse end, forms a small bag, — the air *follicle.* This membrane weighs about 2.25 grains in a common or usual sized egg. It contains what is called the *albumen* or white, and the *vitellus* or yellow. The white consists of two distinct parts, one of which is a delicate membrane forming a series of cells which inclose the other or fluid part. It has the well-known property of being coagulated by heat. The yelk consists of oil, suspended in water, by means of albumen, and held in a membranous sack, the yelk-bag, each end of which is twisted, to form what is called the *chalaza* intended to preserve the yelk in such a position that the *cicatricula* or rudimental embryo shall always be uppermost. The egg loses two or three per cent. of its weight when boiled in water. The white is more easily digested than the yelk, and both are more digestible in the soft than in the hard state. Hen's eggs are decidedly wholesome, and when new-laid are an agreeable and nourishing food.

Eggs are preserved any length of time by greasing them well over with butter or lard, when warm from the nest. It keeps out the air, and, preventing the admission of air through the pores of the shell, preserves eggs for a longer period than they otherwise would be kept good. Fresh-laid eggs are easily known by holding them up to a bright light. If the inside appears semi-transparent and fluid, and the yelk in the centre, it is a fresh egg. On the contrary, if it looks turbid, opaque, or irregularly clouded, it is a stale one, and should be rejected. Also, if an egg held up to a bright light shows a small vacancy at the top of it within, it will produce a male bird; on the contrary, if the little vacancy is observed at the side of the egg, it will prove a female. (Main's *Domestic Poultry*, p. 253.)

A new method of preserving eggs, by packing them in salt with the small end downwards, and by which they have been kept perfectly good for eight or nine months, will, it is believed, enable the inhabitants of portions of our country where eggs abound to make them considerably profitable. Thousands of bushels (and every bushel should contain forty-five dozen), may thus be sent off to the Atlantic markets. Great quantities are used in Franee. It is stated in the *Quarterly Journal of Agriculture* that the number of eggs imported into London alone amounts to near £ 50,000 sterling, or almost two hundred thousand dollars' worth, a year.

There is a communication in the *Farmers' Cabinet*, Vol. II. p. 95, upon keeping hens and the profits from eggs, from a poulterer in Massachusetts, whieh eontains much useful information. " On the first of January," says the writer, " I had ten hens and one cock. In the spring three of the hens were suffered to set, whieh left seven with which to experiment. The three which set raised twenty-four chickens, which were sold for three dollars, when about the size of quails." The sooner, he observes, the chickens are sold, the better, since they do not bring priees corresponding with their increase in size. The seven hens which did not set laid one hundred dozen of eggs. During half the time in winter the fowls were fed upon boiled potatoes and bran or meal mixed together with warm water, and as the place where they were kept was well sheltered, none were lost by the dough freezing in their craws or crops. For the remainder of the time oats were given them, which the writer considers better for fowls than Indian corn, having tried both. The oats were first allowed to soak in warm water for three or four hours, till well swelled, after which they were given to the fowls. Treated in this way, he considers one bushel of oats will go as far as a bushel and a half of corn.

If eoeks, when young, are emasculated, it has a wonderful effect upon their condition, and a similar effeet may be produced upon young hens, by the abstraction of their egg-bags. These operations have been practised upon poultry from the earliest antiquity, for the purpose of improving the flesh. The art of eaponing fowls forms a part of rural economy, but the mode of operating is very little understood in the United States. The chickens intended for capons should be of the largest breed that ean be obtained, and perhaps there is not

one better suited in this respect than the celebrated large *Bucks County breed*, well known in the Philadelphia market, where capons made from these fowls have been sold weighing twenty-five pounds the pair. As in breeding with a special view to making capons, male chickens alone are required, those eggs should be selected to set under the hens which produce males, namely, such as have the sharpest points. The alteration of a chicken into a capon will, in about a twelvemonth, nearly double the size of the bird. Persons wishing to become expert in the operation of making capons may consult Johnson's *Farmers' Encyclopædia*, Article *Capon*, where such ample and minute instructions are given upon the subject, as, with the aid of original drawings, will enable any one to succeed who possesses common dexterity.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

The Egg, which is the only officinal product of the fowl, consists of, — I. An exterior covering, called the shell; II. A white, semi-opaque membrane lining the internal surface of the shell; III. The white or glaire, a viscid liquid contained in very delicate membranes. IV. The yelk, inodorous and of a bland oily taste.

I. The *shell* consists, according to Prout, of carbonate of lime 97; phosphate of lime and magnesia, 1; animal matter, with traces of sulphur and iron, 2. The chalk renders the egg absorbent and antacid; hence its use to neutralize the acidity of wines. When it is burnt, the carbonic acid is dissipated, the animal cement destroyed, and pure lime, with phosphate of lime, obtained.

II. *An albuminous membrane* soluble in alkalis, and from its solution is precipitated by acids. At the larger end of the egg it forms the *follicula aeris*, the air of which, according to Bischoff, contains 23.475 per cent. of oxygen.

III. *The white or glaire* is inodorous and insipid, readily dissolving in water, coagulable by a heat of 165° Fahrenheit, and also by acids and alcohol. When coagulated it becomes sapid, and is no longer soluble, either in cold or hot water. From the experiments of Dr. Bostock, it appears to be composed of water 85.0, albumen 1.2, in one hundred parts; and besides shows traces of uncoagulable matter 2.7, and salts 0.3, sulphuretted hydrogen gas, and benzoic acid.

IV. *The yelk* forms an opaque emulsion when agitated by water. When long boiled, it becomes a granular solid, and yields by expression a yellow, insipid fixed oil. It consists of four constituents, water, oil, albumen, and gelatine ; on the presence of the albumen depends the hardness of the boiled yelk.

Eggs are applied to various purposes in medicine and pharmacy. The shells, powdered and levigated, may be used beneficially as an antacid in diarrhœa. In common with oyster-shells they possess the advantage of uniting intimately animal matter with the carbonate of lime, the particles of which are thus more thoroughly isolated, and prove more acceptable to the stomach, than chalk, in the finest state of division to which the latter can be brought by mechanical means. The dose and mode of preparation are the same with those of oyster-shell.

The white of the egg is used chiefly for the clarification of liquids, which it affects by involving, during its coagulation, the undissolved particles, and rising with them to the surface, or subsiding. When the liquid to be clarified does not spontaneously coagulate the albumen, it is necessary to apply heat. It is recommended as an antidote for corrosive sublimate and sulphate of copper, with which it forms insoluble and comparatively inert compounds. It is sometimes also used for the suspension of insoluble substances in water, but is inferior for this purpose to the yelk, and even to mucilage of gum Arabic. Agitated briskly with a lump of alum it coagulates, at the same time dissolving a portion of the alum, and thus forming an astringent poultice, advantageously applied between folds of gauze over the eye, in some states of ophthalmia.

The yelk in its raw state is gently laxative, and has been thought serviceable in jaundice and other hepatic obstructions. Beaten up with sugar and wine, it is extremely nutritive, and is consequently useful in convalescences and other cases of debility.

As an article of food eggs are the least stimulating of animal substances; and the broth made of the young chicken is not only the best restorative diet for the convalescent, but is also a useful diluent in cholera, dysentery, and other disorders of the bowels. After they are a year old, their flesh becomes less and less digestible; but the capon and poulard retain their tenderness longer.

Lith of E. C Kellogg. Hartford. Conn

Nº 3.

BOS TAURUS.

The Ox and Cow.

VERTEBRATA.

Vertebrated Animals.

No. 3.

BOS TAURUS.

THE OX AND COW.

The animal substanee. *Lac*, *Milk.* A medicinal agent.

Geog. Position. Domesticated everywhere.

Quality. Bland, swectish, faint peculiar odor.

Power. Demuleent, emollient.

Use. In eases of poison. Aliment. Preparation of cream, butter, ehcese, whey, and frangipane.

SCIENTIFIC ANALYSIS.

Natural Classification.

5. Division *Vertebrata.* Class *Mammalia.*

Pereira, Mat. Med., II. 820. Carpenter's Hu. Phy., I. 686, et seq. Ec. Disp. U. S. 174. Jones's An. King. 647. Farmer's Encyc. *Article* Cattle, &c. U. S. Disp. 1344 and 1365.

Genus BOS.

Βοῦς (Gr.), Oxa (Sax.), Ochs, Ochse (G.), Os (D.), Oxe (Swed. and Dan), Uksha (Sans.), Ych (W.), Agh (Erse), Os (Arm.).

The Essential Characters.

Incisors none in the upper jaw, in the lower usually eight. A vacant space between the incisors and molars, but in whieh in some genera are found one or two canines. *Molars* twelve in eaeh jaw, the crown marked with two double crescents of enamel, of whieh the convexity is universally outwards in the lower jaw, and inwards in the upper.

Clavicles none. *Extremities* disposed for walking. Two *toes* furnished with hoofs, metacarpal and metatarsal bones united.

Stomachs four. *Intestines* long.

Mammæ two or four inguinal.

Horns in the male, and frequently in the female of most species.

The Secondary Characters.

Bos. *Body* large. *Members* strong. *Head* large, forehead straight, muzzle square. *Eyes* large. *Ears* generally funnel-shaped. A fold of the skin, or *dew-lap*, on the under side of the neck. *Mammæ* four. *Tail* long, tufted. *Horns* simple, conical, round, with different inflections, but often directed laterally, and the points raised.

The Specific Characters.

Bos Taurus. *Horns* round, lateral, arched, with the point turned outwards. *Face* flat or a little concave. *Occipital crest* in the same line as the base of the horns. *Mammæ* disposed in a square form. *Hair* fawn-colored, brown, or black, not sensibly longer at the anterior than the posterior parts. About seven feet long.

NATURAL HISTORY.

That the Ox has been domesticated and in the service of man from a very remote period is quite certain. We learn from Gen. iv. 20, that cattle were kept by the early descendants of Adam. Preserved by Noah from the flood of waters, the original breed of our present oxen must have been in the neighborhood of Mount Ararat; and hence, dispersing over the face of the globe, altering by climate, by food, and by cultivation, originated the various breeds of modern ages. That the value of the ox tribe has been in all ages and climates highly appreciated, there is abundant evidence. The natives of Egypt, India, and of Hindostan seem alike to have placed the Cow amongst their deities, and, judging by her usefulness to all classes, no animal could, perhaps, have been selected, whose value to mankind is greater.

In nearly all parts of the earth, cattle are employed for their labor, for their milk, and for food. In Southern Africa they are as much the associates of the Caffres as the horse is of the Arab. They share his toils and assist him in tending his herds; they are even trained to battle, in which they become fierce and courageous. In Central Africa the proudest ebony beauties are to be seen on their backs. They have drawn the plough in all ages; in Spain they still trample out the corn; in India, raise the water from the deepest wells to irrigate the thirsty soils of Bengal. When Cæsar invaded

England they constituted the chief riches of its inhabitants, (Cæsar, Lib. V. c. 10,) and they yet form no inconsiderable item in the estimate of that country's abounding riches. An excellent paper on the origin and natural history of the domestic ox and its allied species, by Professor Wilson (*Quarterly Journal of Agriculture*, Vol. II. p. 177), may be consulted with advantage by those who wish for more information on the subject.

The breeds of cattle are remarkable for their numerous varieties, caused by the almost endless crossings of one breed with another, often producing varieties of the most mongrel description, and which are rather difficult to describe. The principal varieties will here only be noticed.

The qualities of a cow are of great importance. Tameness and docility of temper greatly enhance the value of a milch cow. Some degree of hardiness, a sound constitution, health, and a moderate degree of spirits, are qualities to be wished for in a dairy cow, and what those of Ayrshire generally possess. The most valuable qualities which a dairy cow can possess are that she yields much milk, and that of an oily, butyraceous, and caseous nature; and that after she has yielded very large quantities of milk for several years, she shall be as valuable for beef as any other breed of cows known; her fat shall be much more mixed through the whole flesh, and she shall fatten fully as fast, if not faster, than any other.

The pastures in New England are short, and the winters long and severe, and therefore ill adapted to a race of large size, of tender habits, and requiring extraordinary keeping, and the most particular care to maintain their condition. The most celebrated breeds are the improved Durham Short-horn, the Hereford, the Ayrshire, and the North Devon. Of these different races, highly improved animals of each sex, for the purposes of breeding, have been introduced into almost every part of the United States, and each race has found strong advocates, who have preferred it to every other. For dairy purposes, the Ayrshire, or a first cross with the improved Durham and the Devon, is to be preferred. For early maturity and size as beef animals, the improved Durham Short-horn appears to take the lead. But they are tender, and require extraordinary keeping and care to maintain their good qualities. They seem better adapted to the rich

prairies and feeding-grounds of the Western States than to the scanty pastures of the East. The Hereford, of which some remarkably beautiful animals are to be found in York State, have warm advocates both here and abroad, and come in strong competition with the improved Durhams, but exhibiting upon the whole admirable constitution and symmetry. As working oxen and for the purpose of stall-feeding, the North Devon cattle are most generally approved. This, undoubtedly, is the prevalent stock of the country, though diversified and contaminated by various mixtures. No pains have been taken, by systematic efforts, by judicious selection, and by perseverance in endeavors to combine the best qualities and to eradicate or remedy defects, in order to form, from what are called our native stock, a distinct and valuable breed. Indeed, where the improved blood has been introduced, it has been suffered, after a short time, to run out through neglect and carelessness, or to become degenerate by poor keeping.

The Durhams or Short-horns are decidedly the most showy and taking among the cattle species. They are of all colors between a full deep red, and a pure cream-white ; but generally have both intermixed in larger or smaller patches, or intimately blended in a beautiful roan. Black, brown, or brindled are not recognized among pure-bred Short-horns. Their form is well spread, symmetrical, and imposing, and capable of sustaining a large weight of valuable carcass. The horn was originally branching and turned upward, but now frequently has a downward tendency, with the tips pointing towards each other. They are light and comparatively short, clear, highly polished, and waxy. The head is finely formed, with a longer face, but not so fine a muzzle, as the Devon. The neck is delicately formed, without dew-lap; the brisket projecting, and the great depth and width of the chest giving short, well-spread fore-legs. The crops are good; back and loin broad and flat; ribs projecting; deep flank and twist; tail well set up, strong at the roots, and tapering. They have a thick covering of soft hair, and are mellow to the touch, technically termed *handling well.* — They mature early and rapidly for the quantity of food consumed, yielding largely of good beef with little offal. As a breed, they are excellent milkers, though some families of the Short-horns surpass others in this quality. They are inferior

to the Devons in their value as working oxen, and in the richness of their milk. The Short-horns are assigned a high antiquity by the oldest breeders in the counties of Durham and Yorkshire, England, the place of their origin, and for a long time of their almost exclusive breeding. From the marked and decided improvement which they stamp upon other animals, they are evidently an ancient breed, though much the juniors of the Devon and Hereford. Their highly artificial style, form, and character are unquestionably the work of deeply studied and long-continued art; and to the same degree that they have been moulded in unresisting compliance with the dictation of their breeders, have they departed from that light and more agile form of the Devon, which conclusively and beyond the possibility of contradiction marks the more primitive race.

THE HEREFORD. The oxen of Herefordshire are much larger than the Devon, and of a darker red, some are dark yellow, and a few brindled; they generally have white faces, bellies, and throats. They have thicker hides than those of Devonshire, and they are more hardy, and shorter in the carcass and leg; are higher, heavier, and broader in the chine; have more fat and are rounder and wider across the hips; the thigh is more muscular, the shoulders larger. Marshall describes them very correctly, as follows: — "The countenance pleasant, cheerful, open; the forehead broad; eye full and lively; horns bright, taper, and spreading; head small; chap lean; neck long and tapering; chest deep; bosom broad, and projecting forward; shoulder-bone thin, flat, no way protuberant in bone, but full and mellow in flesh; chest full; loin broad; hips standing wide and level with the spine; quarters long and wide at the neck; rump even with the general level of the back; not drooping nor standing high and sharp above the quarters; tail slender and neatly haired; barrel round and roomy, the carcass throughout deep and well spread; ribs broad, standing close and flat on the outer surface, forming a smooth, even barrel, the hindmost large and of full length; round bone small, snug, not prominent; thigh clean, and regularly tapering; legs upright and short; bone below the knee and hough small; feet of middle size; cod and twist round and full; flank large; flesh everywhere mellow, soft, yielding pleasantly to the touch, especially in the chine, the shoulder, and the ribs; hide mellow, supple, of a middle thickness and

loose ; coat neatly haired, bright, and silky ; color of a middle red, with a bold face characteristic of the true Herefordshire breed."

The Ayrshire breed are second to none as milkers ; they are peculiarly fine cattle, and thus described by Mr. Aiton in his excellent treatise (p. 26) on the dairy breed of cows. "The most approved shapes in the dairy breed are small head, rather long, and narrow at the muzzle ; eye small, but smart and lively ; the horns small, clear, crooked, and their roots at considerable distance from each other ; neck long and slender, tapering towards the head, with no loose skin below ; shoulders thin ; fore quarters light ; hind quarters large ; back straight, broad behind ; the joints rather loose and open ; carcass deep and pelvis capacious and wide over the hips, with round, fleshy buttocks ; tail long and small ; legs small and short, with firm joints ; udder capacious, broad and square, stretching forward, and neither fleshy, low hung, nor loose ; the milk-veins are large and prominent ; teats short, all pointing outwards, and at considerable distance from each other, skin thin and loose ; hair soft and woolly ; the head, bones, horns, and all parts of least value, small ; and the general figure compact and well proportioned."

The North Devon. Of this breed the bull should have yellow horns, placed neither too low nor too high, nor be too thick, but growing gradually less towards the points ; the eye clear, prominent, and bright ; the forehead small, flat, and indented ; the muzzle fine ; the cheek small ; the nose of a clear yellow, the nostril high and open ; the neck thick, and the hair about the head curled. The head of the ox is smaller, otherwise he does not differ materially from the shape of the bull ; his action is free, and he is quicker in his movements than any of our oxen ; but his legs are, apparently, placed too much under his chest for speed, yet he possesses this property in an eminent degree ; his legs are straight ; the forearm is large and strong ; the bones of the leg, especially below the knee, very small ; the tail is set on high, on a level with the back, rarely much elevated, never depressed, is long and taper, with a bunch of hair at the end ; the skin is very elastic, mellow, and rather thin ; some have smooth hair, which should be fine and glossy ; some curly, and these are rather the most hardy, and fatten the best ; red is the most favorite color ; many, however, are brown, and others are ap-

proaching to chestnut. Those of a yellow color are reported to be subject to the *steat* (diarrhœa). The Plate, No. 3, is taken from Low's splendid work upon British Animals.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Milk, or to be more precise in our description, *Cow's milk* is an opaque, white, emulsive liquid, with a bland, sweetish taste, and a faint peculiar odor. The constituents of milk are butter, which varies from 2 to 6 per cent.; casein or cheese, usually 4 to 5, but sometimes varying from 3 to 15 per cent. (the last excessive quantity yielded only by the first milk after calving); milk sugar, 4 to 6 per cent.; salts or saline matter, 0.2 to 0.6 per cent.; and water, 80 to 89 per cent. Milk in general contains from 10 to 12 per cent. of solid matter on being evaporated to dryness by a steam heat. The mean specific gravity of cow's milk is 1,030 grains, but it is less if the milk be rich in cream. This latter property, therefore, is subject to considerable variation. Milk owes its whiteness and opacity to an emulsion composed of the caseous matter and butter, with sugar of milk, extractive matter, salts, and free lactic acid.

The *curd* of milk, or *caseous matter*, partakes in many of its chemical properties of the nature of albumen; in others it resembles vegetable gluten, more especially in the fermentation which it undergoes when kept in a moist state. *Sugar of milk* is obtained by evaporating whey. When purified it has a sweet taste, and requires 7 of cold and 4 of boiling water for solution, and is insoluble in alcohol; when digested with nitric acid, it is partially converted into mucous or *saccholactic acid*, and not, like common sugar, into oxalic acid. This, therefore, though an animal product, closely resembles the vegetable proximate principles; and milk may hence be considered as partaking of the nature of vegetable as well as animal food.

When milk, contained in wire-corked bottles, is heated to the boiling point in a water-bath, the oxygen of the included small portion of air under the cork seems to be carbonated, and the milk will afterwards keep fresh, it is said, for a year or two; as green gooseberries and peas do by the same treatment.

Milk is an exceedingly valuable substance in irritation of

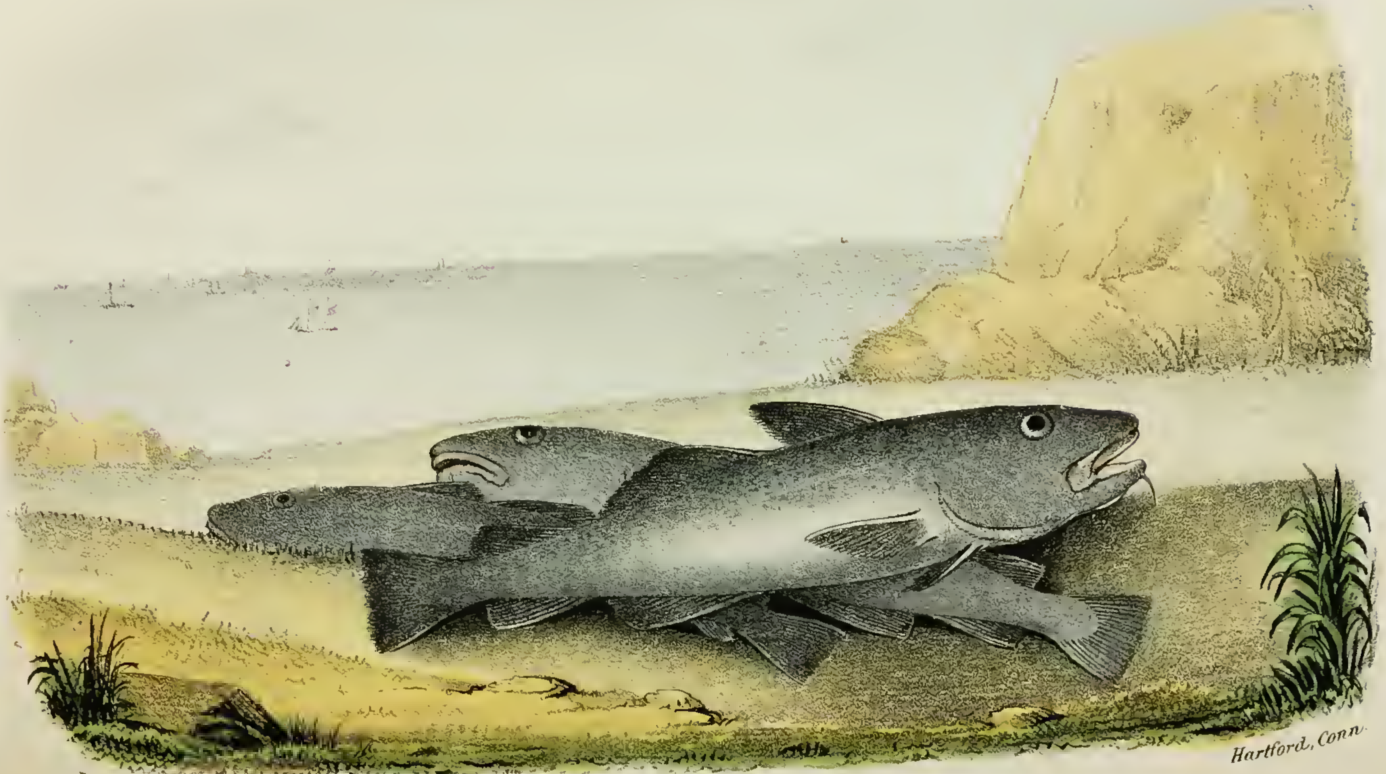
the pulmonary and digestive organs. It is an excellent sheathing agent in poisoning by caustic and acid substances, and in some of these cases it acts as a chemical antidote; for example, in poisoning by bichloride of mercury, sulphate of copper, bichloride of tin, the mineral acids, &c., &c. Milk is also employed, on account of its demulcent qualities, in the preparation of bread and milk poultice, which requires to be frequently renewed on account of the facility with which it undergoes decomposition and acquires acrid qualities.

Whey is an excellent diluent and nutritive. *Wine whey* taken warm and combined with a sodorific regimen, acts powerfully on the skin, and is a valuable domestic remedy in slight colds and febrile disorders.

Ox or Beef's Gall. The bile of the ox is a viscid fluid, of a green or greenish-yellow color, a peculiar, nauseous odor, and a bitter taste; its exact composition is not yet settled. As prepared for medicinal purposes, it is dried by spontaneous evaporation, or aided by a very moderate heat, when it is of a more or less solid and hard consistence, brown color, and possessing its natural and peculiar odor. The method recommended for its preparation is to pour two or three gallons of the gall into a deep vessel, and let it stand for twenty-four hours. Then pour off the supernatant fluid into a shallow earthen dish. Simmer it away slowly, stirring it all the time until it is dry. Then preserve in glass bottles, well stopped. Thus prepared, it is of a bright-green color, friable, pulverulent, and slightly aromatic.

A refined gall is obtained by boiling one pint of it, and skimming; then add alum one ounce, and keep it on the fire for some time; to another pint of gall add one ounce of common salt, in the same manner; keep them bottled, separately, for three months, then decant off the clear liquid; mix them in equal proportions; a thick, yellow coagulum is immediately formed, leaving the refined gall clear and colorless.

Bile is supposed to be tonic and laxative. It is highly valued as a remedy in numerous complaints, and peculiarly applicable to cases attended with deficient biliary secretion. It is used in intermittents, dyspepsia, torpor of the liver, colic, constipation, diarrhœa, dysentery, &c. Five or eight grains of inspissated gall neutralizes the constipating and narcotic effects of one grain of opium, without injuring its sedative influence. Dose, one to ten grains.



Lith of E C. Kellogg. Hartford, Conn.

Nº 4

GADUS MORRHUA.

Common Cod

VERTEBRATA.

Vertebrated Animals.

No. 4.

GADUS MORRHUA.

COMMON COD.

Morrhuæ Oleum.

The animal substance. A medicinal agent.

Cod-Liver Oil.

Geog. Position. Banks of Newfoundland. North Atlantic.

Quality. Noxious.

Power. Alterative, nutritive.

Use. Chronic rheumatism, scrofula, gout, &c.

SCIENTIFIC ANALYSIS.

Natural Classification.

5. Division *Vertebrata.* Class *Pisces.*

Cuvier, Règne Animale, II. 212. Syst. Nat. Gmelin, I. 1162. Ballard and Garrod, Mat. Med. 451. Jones, An. King. 513. Pereira, Mat. Med. II. 804. Thomson, Mat. Med. 1081. U. S. Disp. 506. Wyatt, Nat. Hist. 93. Ec. Disp. U. S. 276.

Genus GADUS.

Huile de morue (Fr.). Stockfisch leberthrun (Ger.).

The Essential Characters.

Skull and vertebral column for the protection of the brain and spinal marrow.

Blood red, cold. Respiring by *gills* or *branchiæ*, and moving in the water by the aid of *fins.*

Ventrals attached under the pectorals.

Pelvis immediately suspended to the bones of the shoulder.

The Secondary Characters.

Gadus. *Ventrals* sharp, pointed, attached under the throat. *Body* compressed, slightly elongated, covered with soft scales. *Head* without scales. *Fins* soft. *Jaws* and front of the vomer armed with unequal pointed teeth in many rows. *Branchiæ* large, with seven rays, two or three dorsal fins, one or two anal, and a distinct caudal.

The Specific Characters.

Gadus morrhua. Three dorsal *fins.* Two anals. A *cirrus* at the point of the lower jaw.

NATURAL HISTORY.

Gadus morrhua. *The common or Bank cod* is the most interesting of all the speeies. Regarded as a supply of food, a source of national industry and eommercial wealth, or as a wonder of nature in its continuanee and multiplieation, this fish may justly challenge the admiration of every intelligent observer. Though found in eonsiderable numbers on the eoasts of other northern regions, an extent of about four hundred and fifty miles of ocean, laving the chill and rugged shores of Newfoundland, is the favorite resort of eountless multitudes of cod, which visit the submarine mountain known as the *Grand Banks*, to feed upon the crustaceous and molluseous animals abundant in such situations. Hither, also, flcets of fishermen regularly adventurc, sure of winning a rich freight in return for their toils and exposure, and of conveying plenty and profit to their homes and employers. Myriads of cod are thus yearly destroyed by human diligenee; myriads of millions, in the egg state, are prevented from eoming into existence, not only by the fishermen, who take the parents before they have spawned, but by hosts of ravenous fishes, and an immense coneourse of other animals, which attend upon their migrations to feed upon their spawn; yet, in despite of the unceasing activity of all these destructive causes, ycar after year finds the abundance still undiminished, inexhaustible by human skill and avidity, irrepressible by the eombined voracity of all the tribes of ocean. This, however, is by no means the sum of destruction to whieh the speeies is liable. After the spawn is hatched, while the fry are too young and feeble to save themselves by flight or rcsistance, they are pursued and devoured in shoals by numerous greedy tyrants of the deep, and, still worse, by their own gluttonous progenitors, clearly showing that, without some extraordinary exertion of creative energy, the existence of the species could not have been protracted beyond a few years. Such, however, is the fecundity with which this race is endowed, that if but one female annually escaped, and her eggs were safely hatehed, the species would be effectually preserved. This is not so surprising, when we reeolleet that the ovaries of eaeh female eontain not fewer than 9,344,000 eggs, as has been aseertained by eareful and repeated observation. Few members of the animal ereation eontribute a greater mass of subsistence to

the human race; still fewer are more universally serviceable than the codfish, of which every part is applied to some useful purpose. When fresh, its beautifully white, firm, and flasky muscles furnish our table with one of the most delicious dainties; salted, dried, or otherwise conserved for future use, it affords a substantial and wholesome article of diet, for which a substitute could not readily be found. The tongue, which is always separated from the head when the fish is first caught, even epicures consider a delicacy; and tongues salted or pickled along with the swimming bladders, which are highly nutritious, being almost entirely pure gelatine, are held in much estimation by housekeepers, under the title of *tongues and sounds.* The liver of the cod, when fresh, is eaten by many with satisfaction, but it is more generally reserved by fishermen for the sake of the large quantity of fine limpid oil which it contains. This is extracted by heat and pressure, and forms the well-known cod-liver oil of commerce, which in many respects, and for most uses, is superior to the commonly used fish-oil. The heads of codfish, after the tongues are cut out, and the gills are saved for bait, are thrown overboard, on account of want of room, and because salting would not preserve them to any advantage. Yet the head, being almost entirely composed of gelatine, is, when fresh, the richest, and perhaps the most nutritive, part of the fish. The fishermen, it is true, make use of it for their own nourishment, but the great mass is thrown into the sea, — a circumstance to be regretted, when it is remembered how many poor, in various charitable institutions, and through the country generally, might be luxuriously fed with this waste. If vessels were provided with the requisite implements and fuel, these heads would furnish a large amount of strong and valuable fish-glue, or isinglass, that would well repay the trouble and expense of its preparation. The intestines of the codfish also yield a tribute to the table. The French fishermen, especially, prepare from them a dish somewhat similar, and not much inferior, to the sounds. Finally, the ovaries, or *roes*, of the females are separated from their membranes, and the eggs, nicely pickled, afford an agreeable and gustful relish, far more delicate and inviting to the palate than the celebrated Russian caviare. In addition to these usual modes of employing the different parts of the codfish, the Norwegians, Icelanders, and Kamtschadales pound up the backbones and other refuse parts, for the purpose of

feeding their dogs and other domestic animals during the winter. Strange as such diet may appear, it is stated as a well-established fact, that cows fed upon these pounded bones, mingled with a small quantity of vegetable matter, yield a larger supply and a better quality of milk than those supported upon more ordinary provender.

The usual mode of preserving codfish for commercial purposes, and the demand is considerable, is by salting them immediately after they are caught, having first removed the head, bowels, &c. Those which are carefully selected, and salted with greater attention to their whiteness, are usually called *dun-fish*, and bring a better price than such as are salted in bulk, with little regard to the discoloration caused by imperfect washing and draining before being packed. Where facilities are afforded for drying by an adjacent shore, or by the construction of the vessel, cod are cured by drying alone, or with a very small quantity of salt. This process requires several days' exposure to sun and air, and when skilfully conducted keeps the fish for an indefinite period in a very desirable condition of whiteness and freshness, both peculiarly advantageous to the appearance of the fish at respectable tables. Cod thus cured are called *stock-fish*, and before being cooked require to be softened, by soaking in water and pounding with a wooden mallet. The spawning season on the Banks of Newfoundland begins about the month of March and terminates in June; consequently the regular period of fishing does not commence before April, on account of the storms, ice, and fogs; and, indeed, many fishermen consider the middle of May as sufficiently early. After the month of June, cod commence their migrations to other quarters, and of course the fishing is suspended until the ensuing season. During the months of April and May fresh cod of several species are caught in considerable abundance on the Atlantic coast of the United States, as far south as the Capes of Delaware, and perhaps still more to the southward.

Cod-liver oil, which is largely consumed in the arts, particularly in the preparation of leather, has long been collected upon the coasts of Newfoundland, Nova Scotia, and New England. Fishermen, whose boats near the shore are small, soon obtain a load, and, running in to land, deliver their cargoes to persons whose business it is to cleanse and salt the fish. The oil is prepared either in the huts of the fishermen,

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or more largely, at establishments to which the livers are conveyed in quantities by the fishermen. These are put into a boiler with water, and heated until they are broken up into a pultaceous mass, which is thrown upon a strainer covering the top of a cask or tub. The liquid portion passes, and upon standing separates into two parts, the oil rising to the surface of the water. The oil is then drawn off, and, having been again strained, is prepared for the market. Another and improved method, which has come into use since the extensive employment of the oil as a medicine, is to heat the livers in a large tin vessel by means of steam externally applied. The pultaceous mass resulting is drained as before mentioned; the livers themselves containing, besides oil, a considerable portion of watery fluid, which passes off with it in the form of emulsion, and separates on standing. The oil thus procured is called *shore oil*, from the circumstances of its preparation, and is the purest kind. The crews of the larger boats, which fish upon the banks far from land, cleanse the fish on board, and, throwing the offal into the sea, put the livers into barrels or other suitable receptacles, where they undergo a gradual putrefactive decomposition, the oil rising to the surface as it escapes from the disintegrating tissue. The oil which first rises, before putrefaction has very decidedly commenced, approaches in purity to the shore oil, but is somewhat darker and less sweet. This is sometimes drawn of, constituting the *straits oil* of the fishermen. The remaining mass, or the whole, if the portion which first rises be not separated, remains exposed a variable length of time to the heat of the sun, undergoing putrefaction, until the boat, having completed her cargo, returns to port. The contents of the casks are then put into boilers, heated with water, and treated as already described. Before being finally put into barrels, the oil is heated to expel all its water. Thus prepared, it is denominated *banks oil*, and is of the darkest color, and most offensive to the taste and smell. Much of the oil prepared by the fishermen is collected by the wholesale dealers in the large towns, who keep it in huge reservoirs of masonry in their cellars, where it becomes clarified by repose, and is pumped into barrels as wanted for use. By the further exposure, however, which it thus undergoes, it acquires a still more offensive odor, while that which has been originally introduced into barrels, and thus kept excluded from the air, is better preserved.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Oleum morrhua. *Cod-liver oil* has been long popularly employed in rheumatic and strumous diseases in the northern parts of Europe. It was brought to the notice of the profession generally by German practitioners, and had acquired great reputation on the Continent before it was used to any extent in Great Britain. The treatise of Professor Bennett of Edinburgh, in 1841, greatly contributed to its reputation, and since the publications of Dr. Williams it has obtained very general notice both in England and the United States. It has now, however, become one of the most esteemed remedies in the whole catalogue of the Materia Medica. The diseases in which it has proved most efficient are chronic rheumatism and gout, and the various morbid affections connected with a scrofulous diathesis, such as external glandular scrofula, diseases of the joints and spine, carious ulcers, tabes mesenteria, rickets, and phthisis. Many respectable physicians and practitioners are now prepared to acknowledge that in phthisis this medicine has far exceeded in efficacy any other remedy or combination of remedies hitherto employed. It is necessary, however, to persevere for four or six weeks before looking for any decidedly favorable result, though the change does often begin earlier. In most cases, remarkable temporary relief is afforded; in very many, the disease is favorably modified and its fatal termination postponed; and in some, cures appear to have been effected. Time and more experience, however, are yet required fully to determine its merits.

The dose is a table-spoonful three or four times a day for adults, a teaspoonful repeated as frequently for children, which may be gradually increased as the stomach will permit, and continued for a long time. It may be taken alone, or mixed with some vehicle calculated to conceal its taste and obviate nauseating effects. For this purpose recourse may be had to any of the aromatic waters, or the aromatic tinctures, as the tincture of orange-peel, diluted with water. Perhaps the best vehicle, when it is not contraindicated, is the froth of porter. Let a table-spoonful of porter be put into the bottom of a glass, upon the surface of this the oil, and over all some of the froth of the porter. It is recommended to chew a small piece of orange-peel before and after taking the medicine. The oil is sometimes applied externally by friction, and in cases of

ascarides or lumbricoides is injected into the rectum. It has been recommended also as a local application in paralysis, various chronic cutaneous eruptions, and opacity of the cornea, after the subsidence of inflammation. In the last-mentioned affection, one or two drops of the oil are applied by means of a pencil to the cornea, and diluted, if found too stimulating, with olive or almond oil. It is said when long used to occasion sometimes an exanthematous or eczematous eruption.

Three varieties of cod-liver oil are known in the market: the *white* or *pale yellow*, the *brownish yellow*, and the *dark brown*, corresponding to the three commercial varieties already alluded to. These differ in no essential character, but simply from the mode of preparation, the pale being prepared from fresh sweet livers, the dark brown from livers in a state of putrefaction, and the brownish yellow from those in an intermediate state, and the three varieties run together by insensible shades. The color of the pale is from the slightest tint of transparent yellow to a fine golden yellow, that of the light brown very similar to the color of Malaga wine, that of the dark brown what its name implies, with opacity in mass, but transparency in thin layers. They are of the usual consistence of lamp oil, and have a peculiar odor and taste, by which they may be distinguished from all other oils. This smell and taste are familiar to most persons, being very similar to those of shoe-leather, at least as prepared in this country, where the curriers make great use of the cod-liver oil. These sensible properties are regarded as the most certain test of the genuineness of the oil. They are much less distinguishable in the pale than in the dark brown varieties, but there are no specimens which do not possess them in some degree. In the purest they are scarcely repulsive, in the dark brown they are very much so. When a decided smell of ordinary fish-oil is perceived, the medicine may always be suspected. It is quite distinct from that peculiar to cod-liver oil. The taste of all the varieties is more or less acrid, and in the most impure is bitterish and somewhat empyreumatic.

From an analysis of the oil by De Jongh it appears to consist of a peculiar substance named gaduin, oleic and margaric acids with glycerin, butyric and acetic acids, various biliary principles, as fellinic, cholic, and bilifellinic acids and bilifulvin, a peculiar substance soluble in alcohol, a peculiar substance insoluble either in water, alcohol, or ether, iodine, chlo-

rinc, and traces of bromine, phosphoric and sulphuric acids, phosphorus, lime, magnesia, soda, and iron. These were found in all the varieties, though not in equal proportion in all; yet it is quite uncertain whether the difference had any relation to their degree of efficacy.

Gaduin is obtained by saponifying the oil with soda, decomposing the soap by acetate of lead, and treating the resulting lead soap with ether, which dissolves the oleate of lead and gaduin, leaving the margarate of lead behind. The ethereal solution, which is dark brown, is decomposed by sulphuric acid, which liberates the brown oleic acid. This owes its color to gaduin, to separate which soda is added in excess; the resulting oleate of soda, which is insoluble in an excess of the alkali, is dissolved in alcohol, and the alcoholic solution is cooled below 32°, by which means the oleate of soda is separated, the gaduin remaining in solution. This is precipitated from its solution by the addition of sulphuric acid. Gaduin is a dark brown substance, brittle and pulverizable when dry, without odor or taste, quite insoluble in water, and in great measure soluble in ether and alcohol. It is insoluble in nitric and muriatic acids, but is dissolved by sulphuric acid, giving a blood-red color to the solution, from which it is precipitated by water and the alkalies. It is soluble in alkaline solutions. Chlorine decolorizes it. Its formula is C_{35}, H_{23}, O_9. By boiling in alcohol it is gradually converted into a blackish-brown insoluble substance. Gaduin itself is yellow, but becomes brown by exposure to the air. It has not been ascertained to be in any degree connected with the virtues of the oil. It is highly probable that the biliary principles associated with the oil are concerned in its peculiar influences, as it is by their presence mainly that this differs from other oils. It has been thought that gaduin itself is of biliary origin. Some have been disposed to ascribe the virtues of the oil to its iodine and bromine, but these are in too small proportion for much effect, and the oil has produced results which have never been obtained from iodine or bromine. The presence of iodine cannot be detected by the usual tests. It is necessary to convert the oil into a soap, and to carbonize this before it will give evidence of iodine. The proportion never exceeds 0.05 per cent. or 1 part in 2,000. The oil is capable of dissolving a larger proportion, and if any specimen contains more, there is reason to suppose that it has been fraudulently added.

Lith. of E. C. Kellogg. Hartford, Conn.

Nº 5.

CANTHARIS VESICATORIA.

The Blister Beetle, or Spanish Fly.

HOMOGANGLIATA.

Articulated Animals.

No. 5.

CANTHARIS VESICATORIA.

THE BLISTER BEETLE, OR SPANISH FLY.

The animal substance. *Cantharidin.* A medicinal agent.

Geog. Position. Europe.
Quality. Acrid, heavy, disagreeable odor.
Power. Stimulant, diuretic, rubefacient, epispastic.
Use. A vesicating material in plaster or oils. Cautiously in gleet, leucorrhœa, paralysis of the bladder. In large doses poisonous.

SCIENTIFIC ANALYSIS

Natural Classification.

4. Division *Homogangliata.* Class *Insecta.*

Ballard and Garrod, 453. Lond. Disp. 231. Thomson's Mat. Med. 982, 1105. Pereira, Mat. Med., II. 782. U. S. Disp. 166. Ec. Disp. U. S. 104.

Genus CANTHARIS.

Cantharides (Fr.), Spanische Fliegen, oder Kanthariden (G.), Spanche Vliegen (Dutch), Spanka (Swed.), Machy Hisapanskie (Pol.), Cantarelle (I.), Cantaridas (S.).

The Essential Characters.

Head provided with two *antennæ* of various forms, and almost always with eleven articulations. *Eyes* two, with facets, no smooth eyes.

Mouth composed of a labrum, or upper lip; a pair of mandibles of a scaly consistence, a pair of jaws, having each one or two pair of palpi, and a labium having a pair of labial palpi. *Mandibles* and jaws for mastication.

Wings four, of which the two upper or anterior are horny or leathery, united down the back by a straight suture. Lower or posterior wings folded longitudinally.

Larva vermiform, with six short feet. *Nymph* inactive, with limbs visible.

Metamorphosis complete.

The Secondary Characters.

Cantharis. *Head* large, heart-shaped, not produced into a rostrum. *Thorax* small, rather quadrate, narrower than the elytra, which are as long as the abdomen, soft, linear, the apex slightly gaping. *Maxilla* with two membranous *laciniæ*, the external one acute, within subuncinate. *Maxillary palpi* with terminal joint somewhat ovate, larger at tip. *Wings* two, ample, perfect.

The Specific Characters.

Cantharis vesicatoria. *Head* large, subcordate with a longitudinal furrow along its top. *Eyes* lateral, dark brown. *Thorax* not larger than the head, narrowed at the base. *Elytra* from four to six lines long, and from three fourths to one and a half lines broad. *Costa* slightly margined. *Wings* ample, thin, membranous, veined, transparent, pale brown. *Tips* folded. *Legs* stout, from four to six lines long, the hinder ones longest. *Tibiæ* clavate, in the female all terminated by two small movable *spurs;* in the male the two hinder pairs of extremities alone have this arrangement, the anterior ones having but one spur. Last joint of the *tarsi* with a pair of bifid claws. *Abdomen* soft, broadest in the female. In the female, near the anus, are two articulated, caudal appendages. *Form* elongated, almost cylindrical. *Length* six to eleven lines. *Breadth* one to two lines. *Color* brass or copper green. *Odor* nauseous, unpleasant. *Body* covered with whitish-gray hairs, which are most numerous on the thorax.

NATURAL HISTORY.

Hippocrates employed in medicine an insect which he calls κανθαρίς, whose effects were similar to those of *Cantharis vesicatoria.* Hence it has been erroneously inferred that the blister beetle is identical with that employed by the ancients. That this inference is incorrect is apparent. Many beetles agree in their effects on the system with those of *Cantharis vesicatoria.* The Greek word merely signifies a small beetle, *scarabæus parvus.* Both Dioscorides and Pliny refer to several kinds of *Cantharides*, but remark that the most powerful are those with transverse yellow bands on the wings, and that those which are homogeneous in color are weak and inert.

It is tolerably clear, therefore, that neither of these ancient writers were acquainted with *Cantharis vesicatoria.* The characters also assigned to the ancient blistering insect agree precisely with those of two species of *Mylabris.* Burmeister suggests, therefore, that *Mylabris fusselini*, a native of the South of Europe, was the species used by the ancients. *Mylabris Cichorii* is employed as a blistering beetle at the present day in China, and some parts of Hindostan, and may, perhaps, have been used by the Greeks and Romans.

Cantharis vesicatoria, the *blister beetle*, from which cantharidin is procured, is a coleopterous insect. It is oblong, nearly parallel for two thirds of its length, and then tapering to the extremity. It is about two thirds of an inch long, and a quarter of an inch broad ; the elytra or wing-covers are green, shining, and tinted with a golden hue ; the wing-sheaths are marked with three longitudinal, raised stripes ; the wings are brown, membranous, and transparent. The body is terminated with two small, callous, sharp spines ; the head, which is gibbous, bears two black, jointed, thread-like feelers, and along the head and the chest there is a longitudinal furrow. It is of some importance to know the real character of the blister beetle, as the specimens of it are frequently mixed with the *Melolentha, Scarabæi, Cetoniæ*, and other beetles. It is a curious fact, that the circulating, respiratory, and nervous system of this insect, in conjunction with the generative organs, has a singular analogy with those of the vertebrated animals. This beetle is found in every part of Europe where the vine flourishes naturally in the open air, that is, from the equator to the fifty-second degree of north latitude ; it has also been seen in the South of England, and is abundant in the southern provinces of Russia. It feeds upon the ash, the privet, the lilac, the honeysuckle, the rose, willow, poplar, and elm. When it is very abundant, an odor resembling that of the mouse is exhaled ; and it is probable that the cause of the *ardor urinæ* and ophthalmia, experienced by persons who sit under a tree containing many of these insects during the time of their copulation, is to be attributed to the cantharidin being carried off with the volatile oil which causes this odor. Ophthalmia is severely felt by those who prepare cantharidin, unless the eyes be protected by gauze shades.

For medicinal purposes, Cantharides are collected in May, by shaking them at dawn, when they are torpid, from the trees upon which they settle, and catching them on cloths; they are then killed by the vapor of boiling vinegar, — a process as ancient as Dioscorides, who describes it. Sometimes they are killed by dipping the cloths on which they are collected into vinegar and water, after which they are dried by exposure to the sun. During the drying, the insects require to be frequently turned; and if the hands of those who perform this operation be not guarded with gloves, great pain is felt at the neck of the bladder, and strangury and *ardor urinæ* supervene. When properly dried, Cantharides preserve their active properties for more than thirty years. They are often attacked by a small mite or acarus, which, devouring the soft parts, leaves only the hard parts, or the shell of the insect, thus rendering it nearly inert. The only method to stop the depredations of this parasite is to put a little pyroligneous acid into the bottle containing the Cantharides; or some carbonate of ammonia; or to kill the beetle with oil of turpentine instead of vinegar.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

The substance Cantharidin is procured by the following process from the soft parts of the *Cantharis vesicatoria*, the blister beetle. Prepare an alcoholic tincture by percolation, concentrate it, and set it aside; as the evaporation proceeds, the cantharidin crystallizes. It is purified from the resinous matter adhering to it, by washing with cold alcohol, and afterwards boiling it in alcohol with animal charcoal. It is a white substance, and may be regarded as a resinoid.

The blister beetle is justly regarded as a direct stimulant diuretic, when administered in doses not sufficient to excite inflammation of the alimentary canal. These diuretic properties of this insect were known to Hippocrates, who prescribed them in dropsy and amenorrhœa. A very celebrated diuretic also, that of Tulpius, consisted of a tincture of blister beetles, tincture of cardamoms, and sweet spirit of nitre. The effects of this insect upon the urinary organs were also very generally known in Oriental countries and in the South of Europe, where it was used as an *aphrodisiac;* but unless they were employed with the greatest caution, the volup-

tuary who swallowed the powder bought his momentary gratification by pains and suffering of a very acute description, and it is doubtful whether the anticipated effect was obtained. Like many other popular beliefs, it seems to rest upon a very doubtful foundation. It is, nevertheless, true, that Cantharides, internally administered in large doses, cause priapism, which is occasionally, not always, accompanied with satyriasis. It was probable that the violence of these results of the internal use of the Cantharides tended to prevent them from being much employed as a diuretic.

When Cantharides are swallowed, they are partially digested, and the cantharidin is, probably in conjunction with the oil, received into the circulation. But whether it be this principle or the entire matter of the insect, in minute division, that is absorbed and conveyed to the kidneys, its influence upon these organs is stimulant, and, when large doses are administered, may amount to acute inflammatory action, producing bloody urine, insupportable pains in the abdomen, strangury, vomitings, convulsions, delirium; and frequently the issue is fatal. The *post mortem* examination of the body displays inflammation, not only in the urinary and genital organs, but in the mucous membrane of the alimentary canal. When administered in proper doses, namely, one or two grains, Cantharides stimulate the kidneys, and cause an increased flow of urine. Their effect is stimulant in the first instance; but this is transitory, and, whilst there is a copious increase of the urinary discharge, neither heat of the kidney nor strangury is experienced. They have been found extremely useful, when administered as a diuretic, in scaly affections of the skin; but this is the result rather of the general stimulus given to the capillary system than of their diuretic power. They have been employed with success in the ascites of old, worn-out constitutions. It is requisite, during their employment, to dilute freely with bland fluids. If strangury occur, the best mode of relieving it is to throw into the rectum a pint of warm water, containing from twenty to sixty minims of laudanum. Notwithstanding the safety and advantage with which they may be internally administered, they have not been much employed, and, indeed, when it is considered that many individuals suffer considerably, even from the absorption of such minute portions as can be taken up from a blistering plaster, the danger of an incautious em-

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ployment of them internally is sufficient to set aside their general administration.

When Cantharides have been accidentally taken in large doses, the best mode of counteracting the dangerous symptoms is to administer emetics, to bleed, and to dilute copiously with bland, demulcent drinks. The use of oil must be carefully avoided; for as oil is the best solvent of cantharidin, the poison is only the more widely diffused, and consequently it is rendered more extensively hurtful. Many of the cases of poisoning by Cantharides have arisen from the poison having been swallowed with the view of exciting the venereal appetite; for, as in many cases this effect has not followed the ordinary dose, large doses have been swallowed. The greater number of the cases detailed by toxicological writers have not terminated fatally, although the sufferings of the patients have been most severe. In some instances the inflammation of the genital organs has run on to gangrene; which was the case in a fatal instance noticed by Ambrose Paré, which was caused by a young woman seasoning comfits for her lover with Cantharides. In some instances phrenitic symptoms, with tetanic convulsions and hydrophobia, have been the consequence of over-doses of the tincture.

The *emplastrum Cantharidis* of the Pharmacopœias, the substance commonly applied for producing a blister, has some disadvantages attending its employment. It consists of one part of finely powdered Cantharides blended with one or two parts of wax plaster. In the first place, the formation of the plaster by heat injures the activity of the Cantharides; in the second place there is a great waste, as only those particles of the powdered insect which are upon the surface are of use. It would, therefore, be much better, were some kind of semi-adhesive paste contrived for forming the basis of the plaster, upon which the powdered Cantharides could be sprinkled before applying the plaster to the skin. Were cantharidin easily prepared, the most certain blister would be a solution of that substance in oil; but the tediousness of the process, and the smallness of the product, render it impossible to employ it for ordinary purposes. The plaster of Cantharides causes, first, a sensation of heat and pricking in the part, attended with some general excitement and increased quickness of the pulse; if it remain on a sufficient space of time, namely, from six to ten hours, the cuticle is raised, and betwixt it and the

true skin a yellowish serum is deposited. Sometimes fresh blisters continue to rise round the first blister after the plaster has been removed. Both the degree of excitement and the character of the effused serum, and its quantity, are greatly modified by circumstances connected with the general habits of individuals, and the disease for which the blister is applied. In many persons, the acrid principle of the insect is carried into the circulation, and produces strangury; especially when the blister is applied to the scalp. In this case the hair should be removed some hours before applying the blister, if the necessity of the case admit of delay. The usual time for permitting a blistering plaster to remain applied is ten or twelve hours, when it is usual to puncture the blister, and, after discharging the fluid, again to apply the plaster. This practice is to be reprobated, inasmuch as it does not answer any beneficial purpose, and it favors the absorption of the cantharidin and the consequent production of strangury. As soon as a blister has risen, the plaster ought to be removed, and the fluid discharged. In children, in particular, this rule should always be attended to; as, owing to great irritability of skin, they are not only more easily blistered than adults, but when the blistering plaster is permitted to remain too long applied, spreading, irritable, sometimes gangrenous ulcers are apt to supervene. When this happens, the strength of the patient must be sustained by bark or other tonics, the irritability of the part soothed by poultices made with a strong decoction of poppies, and every method which can change the irritable state of the habit into one of tone must be adopted.

Blisters, by whatever means raised, should be applied as near as possible to the affected part. They should also be as large as the nature of the part will permit; large blisters causing no more pain than small. In every instance, the blistering plaster should be kept in close contact with the skin by a few strips of adhesive plaster, or a bandage; nevertheless, the pressure ought not to be so great as to restrain the inflammation of the capillaries, and prevent vesication. Strangury is best prevented by interposing something between the blistering plaster and the skin. Gauze or muslin, or thin paper, moistened with oil, pressed down upon the blistering plaster, answers the purpose effectually, does not prevent vesication, and enables the plaster to be removed in a more cleanly manner. When the tendency to strangury is great, the blistering

plaster ought not to remain on longer than is necessary to effect vesication, which takes place, generally, at the distance of eight hours, even when the blister plaster has been removed two hours before that time, and no vesication be then present.

Of late years, another insect has been introdueed into practice as a substitute for Cantharides, which appears to possess all their vesicant and diuretic properties. This is a species of the genus *Mylabris*, one species of which, the *Mylabris chicorii*, is a native of the South of France, Italy, and Greece, and known to the ancients. The genus Mylabris consists of fifty-one speeies, of which twenty-eight are found in Africa. The species employed as a substitute for Cantharides is the *Mylabris variabilis.* It is brought from China, and is regarded rather as a variety of the *Mylabris chicorii* than a distinct species. M. Robiquet has analyzed it, and has found that it affords cantharidin in as great abundance as the Cantharides. It acts with as much energy as a vesicant as the best Cantharides. Another species of Mylabris, the *Mylabris pustulata* of Olivier, is also used as a vesicant in China. Some species of Meloe, the *Proscarabæus* and *Majalis* in particular, also contain cantharidin; they may be used both as vesicants and diuretics. If an easy method of obtaining cantharidin were discovered, its use might supersede that of the entire insect. The powder of Cantharides is now seldom used as an internal medicine, and the tincture, which is undoubtedly the best preparation of the insect, is also the most generally employed.

Tinctura Cantharidis. *Tincture of Blister Beetles.* Take of blister beetles, bruised, *an ounce;* diluted alcohol, *two pints.* Macerate for fourteen days, express, and filter through paper.

The *London College* takes four drachms of the beetles, and *two pints* (Imperial measure) of proof spirit, macerates for seven days, expresses, and filters. The *Dublin, half an ounce* (avoirdupois) of the former, and *two pints* (Imperial measure) of the latter, and macerates for two weeks, strains, expresses, and filters. The *Edinburgh College* takes the same proportions as the London, digests for seven days, strains, expresses the residuum strongly, and filters; or prepares the tincture by percolation, having previously moistened the coarsely powdered beetles with a little of the spirit, and allowed them to stand for twelve hours.

Lith. of E. C. Kellogg Hartford. Conn.

Nº 6.
APIS MELLIFICA.
The hive bee, or the Honey bee.

HOMOGANGLIATA.

Articulated Animals.

No. 6.

APIS MELLIFICA.

THE HIVE-BEE, OR THE HONEY-BEE.

The animal substance. *Mel, Honey.* *Cera, Wax.* A medicinal agent.

Geog. Position. Domesticated everywhere.

Quality. Honey, sweet, viscid. Wax, insipid, inodorous.

Power. Honey, demulcent, nutritive, slightly laxative. Wax, emollient.

Use. Honey. Catarrhal coughs, a vehicle for the administration of powders. Wax. Diarrhœa, dysentery; a constituent of all cerates.

SCIENTIFIC ANALYSIS.

Natural Classification.

4. Division *Homogangliata.* Class *Insecta.*

Ballard and Garrod, Mat. Med. 459. Jones, An. King. 286 Pereira, Mat. Med. II. 795 Thomson, Mat. Med. 855, 1175. Lond. Disp. 431, 256. U. S. Disp. 473, 204. Wyatt, Nat. Hist. 137. Ec. Disp. U. S. 258, 116. Kost, Mat. Med. 118. Farmer's Encyc. Brand, Encyc. Sci.

Genus APIS.

Mel. Miel (F.), Gemeiner Honig (G., Dutch), Mele (It.), Miel (Sp.), Honung (Swed.), Honning (Dan), Miod (Pol), Mel (Port.), Med (Russ), Medhu (Hind. and San), Tayn (Tam.), Ussub (Arab.), Shahid (Pers.), Tejee(Beg.), Honey (Eng.).

Cera flava. Cire jaune (F.), Wachs (G.), Cera gialla (It.), Cera gualda (Sp.), Gult wax (Swed), Zotty wosk (Pol.), Munjie Mellughoo (Tam.), Unbleached wax (Eng.).

Cera alba. Cire blanche (F.), Cera biancha (It.), Cera blanca (Sp.), Hwitt wax (Swed), Biaty Wosk (Pol.), Vulay Mellughoo (Tam.), Suffiad mooru (Duk.), Bleached wax (Eng.).

The Essential Characters.

Wings four, naked, membranous, veined longitudinally, the superior of which are always longer than the inferior.

Mouth composed of jaws and a labium very narrow, (besides the labium and mandibles,) forming a demi-tube more suitable for suction than mastication.

Envelope of the body not crustaceous.
Tarsi with five joints.
Abdomen generally attached to the thorax by a very slender pedicle, terminated in the females, either by an ovipositor in the form of a saw, or by a simple retractile sting, which introduces an irritating fluid into the wounds it creates.
Metamorphosis complete.

The Secondary Characters.

Apis. *Labium* filiform, composing with the jaws a kind of *proboscis*, geniculate and bent downwards. First joint of the posterior tarsus large and compressed in the form of a square and triangular face. No spines at the extremity of the last two *legs*. Upper *wings* with one radial and three cubital cells.

The Specific Characters.

Apis mellifica. Blackish. *Abdomen* of the same color, with a transverse grayish band, formed by the down at the base of the third and following segment.

NATURAL HISTORY.

The Bee is an industrious and useful insect, and well worthy the attention of all classes, and will repay the utmost care that can be taken in its management.

No farm or cottage garden is complete without a row of these busy little colonies, with their warm, neat roofs, and their own particular fragrant bed of thyme, in which they especially delight. Select a sheltered part of the garden, screened by a wall from the cutting north and easterly winds; let them enjoy a southern sun, but do not place them facing his early beams, because bees should never be tempted to quit their hive in the heavy morning dew, which clogs their limbs and impedes their flight. Place them, if possible, near a running stream, as they delight in plenty of water; but if none is within their easy reach, place pans of fresh water near the hives, in which mix a little common salt, and let bits of stick float on the surface to enable bees to drink safely. Never place hives in a roofed stand; it heats them, and induces the bees frequently to form combs outside of their hives instead of swarming. Let the space before the hives be perfectly clear of bushes, trees, and every impediment to their movement, that they may wing their way easily to seek for food,

and return without annoyance. Bees returning heavily laden and wearied are unable to bear up against any object, and should they hit any thing, they fall. Let their passage to and from their hives be clear, but trees and bushes in the vicinity of their residence are advisable, as they present convenient spots for swarms to settle, which might otherwise go beyond sight or reach. A swarm seldom goes far from home, unless the garden is unprovided with resting-places to attract the queen, who takes refuge in the nearest shelter. Towards the end of October, if not otherwise properly provided, remove the hives into a cool, dry, and shady room, outhouse, or cellar, where they will be protected as well from the winter sun as from the frosts. Warm days in winter often tempt bees to quit their cells, and the chilling air numbs and destroys them. Let them remain thus until about the end of March. In the spring bees are very subject to a disease similar to dysentery. Before the hives are placed in their summer quarters, examine the state of the bees, by turning up the hive and noticing the smell proceeding from it. If the bees are healthy, the odor will be that of heated wax; but if diseased, it will appear like that of putrefaction. In this case, a small quantity of port wine or brandy mixed with their food will restore them. In the early spring feed them, and do the same when the flowers pass away in autumn, until they are taken into the house, and then disturb them no more.

As to the best situation for bees during their working season, this must depend upon circumstances of climate and locality. In southerly latitudes and warm exposures, where the climate will admit of the hives remaining upon the stands during winter, it may still be advisable to give some shelter; and the principal object should be to ward off the sun, the warmth from which invites the bees to fly abroad at an unprofitable season, and makes them sensitive to the sudden spells of cold experienced throughout the United States. In summer the extreme heat of the sun should certainly be warded off by sheds and suitable shades, although it is improper to oblige the bees to pass through barriers of boughs and bushes. The heat accumulated by objects exposed to the direct rays of the sun often increases to 130° or 140° of Fahrenheit, a temperature which must be injurious, not only to the bees themselves, but to their honey and wax.

As soon as the bees commence working in the spring, the

hives should be examined, and, with a piece of hoop-iron or other suitable implement, the stand should be well scraped immediately under them, and especially around their inner edge. The whole secret of keeping off the moth, that commits great devastation among bees, consists in keeping the hives free from the larva or maggot of these troublesome insects. After this scraping operation, the hive should be raised not quite half an inch from the stand, and the cleaning be repeated every three or four days, especially if there be any appearance of web. In winter the hive should be let down upon the stand, as a security against mice and other depredators upon the honey. An entrance should be made for the bees, by cutting a perpendicular slit one eighth of an inch wide and two and a half inches long, situated about half way from the bottom. Just under this a small shelf is to be placed, as a resting-place for the bees in going out and returning to the hive. The bees soon get accustomed to this new place of entrance. It is said this plan has often proved an effectual security against the worm, after every other remedy has failed.

As bees, like most other winged insects, are annuals, or go through the whole essential economy of their existence within the year, the history of a year's existence includes the whole, and it is only requisite to choose the point in the circle at which to commence. As some individuals, however, always survive the winter and begin to breed only in spring, forming a colony which quits the parent stock, we shall begin with this colony and trace their operations through the year.

The first young swarm is generally sent off about the end of June. The migration seems to depend on want of room in the mother hive, not on an instinctive desire of change on the part of the brood; for if there be space for the operations of the increasing community, bees will not naturally swarm, and skilful apiarians sometimes take advantage of this circumstance, and, by making successive additions to the hive, retain the whole year's increase in the same building. The swarm consists in general of about six or seven thousand individuals, of which about one thirtieth part are males, the rest females, and of these one only, for the most part, is prolific, and she is called the queen. Her body is longer than that of either the drone or worker, her colors are brighter and purer and generally of a darker shade, the transverse bands across

the abdomen are of a deeper and brighter yellow, and are sometimes orange; the head is smaller than that of the unprolific female, and the tongue is shorter and more slender; her mandibles are notched and her sting is curved; but the most obvious distinctive character is the proportional length of the abdominal segment of the body, which lodges the generative apparatus, and which is of an elongate conical form, tapering rather sharply to the anus. The male bee is readily distinguished by the short and thick form of his body, which is obtuse at each extremity. He has no sting. The workers, like the queen, are armed with a sting, but it is straight and proportionally larger and stronger. The workers are essentially females in their internal structure, but their growth is arrested before arriving at the period when the full development of the sexual system takes place, and they consequently are smaller than either the queen or the drones, and their colors are less bright. According to Huber, there are two varieties of laborers, one of a large size, which he calls "*abeilles cirières*," or makers of wax; the other or smaller variety he terms "*abeilles nourrices*," or nurse bees, whose crop or first stomach is not capable of the distention requisite for collecting honey, but whose office it is to build the combs and cells, after the foundation has been laid by the *cirières*, and to feed the larvæ.

It is also stated that there are two kinds of drones, one not larger than the workers, the other as above described. And Huber has described another variety of the inmates of the hive, which he terms "*black bees*," and which are supposed to be the superannuated workers.

The swarm thus composed commonly leaves the hive in the heat of the day, and often immediately after a shower. It is supposed that the queen takes the lead, and she ever afterwards exercises an inscrutable influence over all the operations. Perhaps a stronger proof that instincts do not necessarily depend on physical conformation is not afforded by any phenomenon in natural history, than by the effects which the loss or death of the queen produces on the laborers. This event does not deprive them of any organ, or paralyze any limb; yet the moment they are conscious of her loss, all their labors are interrupted and forsaken, and unless another queen be provided, they join another hive, or perish from inanition.

The flight of the swarm is directed to some neighboring

fixed place, and wherever the stand is made, they all forthwith repair to it. In the wild state, the cavity of an old tree is commonly chosen, and this with a seeming prudence and foresight which cannot be sufficiently admired. The first care of the bees is to cleanse it from dust and rubbish, and to gnaw off with their mandibles any asperities or projections which might interfere with the future construction of the comb. In the state of domestication in which the hive-bee is usually preserved, the practice of the above instinctive actions is rendered unnecessary by the reception of the swarms into neat artificial hives. Yet this modification of their habits, and many other interferences to which they are subject, have had no effect in inducing any varieties in the organization of the bee, or any change in those instinctive actions which the care of man has not rendered indispensable. The consideration of this curious exception to the ordinary consequences of domestication and of the conditions on which the circumscribed limits of variation in the bee depend, would lead us far beyond the extent allotted to the present subject; but it is an inquiry full of interest in relation to the recondite laws which govern the variation of animals from their specific standard.

In the wild state, the young colony at first return occasionally to the parent establishment for supplies of provision, and the domesticated bees always fill their crops with honey before they leave the hive. The wax is a peculiar secretion from the working bee, and having the materials therefore within themselves, they immediately begin to form the comb.

Before describing the many-chambered nursery and storehouse which the bees prepare, a few words are necessary regarding the material of which it is constructed.

The formation of the wax is a very singular and complex operation. Huber says: " The wax-makers having taken their due portion of honey or sugar, from either of which wax can be elaborated, suspend themselves to each other, the claws of the forelegs of the lowermost being attached to those of the hind pair of the uppermost, and form themselves into a cluster, the exterior layer of which looks like a kind of curtain. This cluster consists of a series of festoons, or garlands which cross each other in all directions, and in which most of the bees turn their back upon the observer; the curtain has no other motion than what it receives from the inferior layers,

the fluctuations of which are communicated to it. All this time the nurse bees preserve their wonted activity, and pursue their usual employments. The wax-makers remain immovable for about twenty-four hours, during which period the formation of the wax takes place, and thin laminæ of this material may be generally perceived under their abdomen. One of these bees is now seen to detach itself from one of the central garlands of the cluster, to make a way amongst its companions to the middle of the vault or top of the hive, and by turning itself round to form a kind of void, in which it can move itself freely. It then suspends itself to the centre of the space which it has cleared, the diameter of which is about an inch. It next seizes one of the laminæ of wax with a pincer formed by the posterior metatarsus and tibia, and, drawing it from beneath the abdominal segment, one of the anterior legs takes it with its claws and carries it to the mouth."

The wax has perhaps a nearer analogy to the sebaceous secretion of the integument than to any other animal secretion; it is formed beneath the scales on the under side of the abdomen, and when accumulated there, seems to irritate the part, for the bee may then be observed wagging her abdomen and running round, to and fro, as if endeavoring to shake out the little scales; and she is generally followed by one or two other bees which have been attracted by her movements, and are ready to seize upon the plates of wax as they fall. How the bees mould the scales into the walls of the cells is not exactly understood. Some have supposed that they bite pieces off and join them together, but the smooth and uniform surface of the cell shows that some other operation must take place; besides, the wall of the cell is sometimes thicker than a scale of wax. It is therefore supposed that the bees have the power of applying some dissolving or softening menstruum to the wax-scales, by which they are enabled to knead and blend them into a ductile paste. And when it is remembered that the secretion of the salivary tubes of insects is generally alkaline, and that wax is best dissolved by alkali, it is reasonable to suppose that it is by this means that the wax-scales are brought into a workable state. Reaumer indeed observed a frothy substance exuding from the mouth of a bee while working at a cell, which was applied to the proper place by the nimble tongue, and then kneaded in by the mandibles; and Huber has described the process very circumstantially; he says

that the bee holds the lamina of wax with its claws vertically, — the tongue rolled up serving for a support, —and, by elevating or depressing it at will, causes the whole of its circumference to be exposed to the action of the mandibles, so that the margin is soon gnawed into pieces, which drop as they are detached into the double cavity bordered with hairs of the mandibles. These fragments, pressed by others newly separated, fall on one side of the mouth, and issue from it in the form of a very narrow ribbon. They are then presented to the tongue, which impregnates them with a frothy liquor. During this operation the tongue assumes all sorts of forms; sometimes it is flattened like a spatula, then like a trowel, which applies itself to the ribbon of wax; at other times it resembles a pencil terminating in a point. After having moistened the whole of the ribbon, the tongue pushes it so as to make it reenter the mandibles, but in an opposite direction, where it is worked up anew. The liquor mixed with the wax communicates to it a whiteness and opacity which it had not before, and doubtless gives it that ductility and tenacity which it possesses in its perfect state.

Bees commonly begin at the top or roof of their chamber and build downwards, at first working irregularly, and as it were pasting over the surface, and then building horizontal cells of a more perfect form. These at length become so numerous that they extend downwards in the form of a vertical wall; other congeries of cells are formed in succession, until the whole comb assumes the form of a series of perpendicular plates or partitions. Each plate consists of a double set of cells, the bottoms of which are applied to each other and form the partition between each set. The plates are not always regular, and the irregularities which may be observed are not always necessary adaptations to a peculiar form of the cavity in which they are built. The cells are not all of the same size, but a sufficient number of a given depth are reserved for receiving the eggs, and which are necessarily adapted to the size of the future maggot; the smaller or shallower cells are those in which the honey is stored. The breeding and store cells are placed horizontally, but the mouth of the cell is sometimes a little raised, the better to retain the honey. The interspace between the vertical combs is about half an inch, these streets, as they may be termed, in this city of industry, being just wide enough to allow two bees busied upon the opposite cells

to pass without incommoding each other. In addition to these interspaces, the combs are perforated in various places so as to allow a passage for the bees from one street to another, thus saving them much time.

The shape of each cell is not, as might have been expected, cylindrical, or that which seems best adapted to the form of the maggot, or even of the bee constructor, but it is hexagonal, — the only form which allows the cell to be of the largest size in proportion to the quantity of matter employed, and at the same time to be so disposed as to occupy in the hive the least possible space. The form of the base of each cell, which is in apposition with the one on the opposite side, is also such as to gain greater strength and more capacity with less expenditure of wax, the latter consideration being one of great importance to bees, which do not secrete a very large quantity of this material: and the most profound mathematicians and most skilful geometers have found the solution of the problem relating to the attainment of the preceding objects as derived from the infinitesimal calculus to have a surprising agreement with the actual measure of the different angles formed by the walls of the cells.

There may generally be observed one or more cells wider and shallower than the rest, placed either on the edge of a comb or partition, or against the mouths of the cells, and projecting beyond the general surface of the comb. These are called the royal cells; but as they are not adapted to the form of the queen, nor ever lined with the silken covering of the chrysalis, the supposition that she is bred in them seems impossible.

Having now generally described the comb, the consideration of those instinctive operations by which its several compartments are furnished with their destined contents deserves attention.

The comb seems at first to be formed entirely for propagation, and indeed to be essentially related to that function, for if the workers lose their queen they make no combs, and the reception of honey is therefore its secondary use. Wasps and hornets make combs, although they collect no honey.

As soon as the young colony has prepared a few combs, the female begins to exclude her eggs. The first that she lays produce the imperfect females or workers, the subsequent ones produce the males, and perhaps the fertile females, or queens. The eggs are deposited at the bottom of the cells, often before

they are half completed; they adhere generally by one end to the cell. In about five days the little maggot is hatched, and is seen lying at the bottom of the cell, coiled up in a transparent fluid.

Now begins the additional employment of the laborers, that of feeding and nursing the young maggots; and for this purpose new materials must be collected abroad and brought into the hive.

At first the bees of a young colony fly out singly, and afterwards collectively. They direct their flight generally in a straight line or nearest way to the desired object, and often travel to great distances from the hive. In summer time they may be seen almost everywhere where flowers bloom. In April and May they are abroad the whole day, but in the hot months they venture out less frequently, generally in the morning and evening, at which times it is more easy for them to form the pellets of the pollen, the grains of which adhere together less strongly during the heat of noonday.

Bees do not like wet weather, yet it is perhaps less the presence of rain than the changes in the degree of light which deter them from venturing abroad at this time; for they possess large and complex organs of sight, and when clouds collect quickly over the clear sky, they are seen to hurry back in great numbers to the hive, while if the sky be uniformly overcast, it is not merely a shower of rain that will drive them back; many of the actions of the bee prove, on the contrary, how essential moisture is for them. The bee does not take honey indiscriminately from every flower. In the meadows they may be seen generally upon the Orchidaceæ, Polygonaceæ, Caryophyllaceæ, but seldom if ever upon the Ranunculaceæ, perhaps on account of some poisonous quality. The oleander (*Nerium oleander*), which yields poisonous honey fatal to thousands of flies, is carefully avoided by bees, and the crown imperial (*Fritillaria imperialis*), the white nectaries of which are so conspicuous, tempts in vain the passing bee. They are, however, extraordinarily active in spring at the blossoming of the Amentaceæ, Rosaceæ (especially the dog-rose), and the balsamic lilies, Primulaceæ, &c., and are above all allured by the innumerable flowers of the lime (especially *Tilia parvifolia*), and their hum may be heard among the branches at some distance. The finest-flavored and most delicate honey is collected from aromatic plants, and it is

therefore always advisable to have large beds of borage, mignonette, lemon thyme, and sage in the neighborhood of beehives. Those flowers which yield a nectar innocuous to the bees themselves, but possessing poisonous qualities when taken by man, are sometimes frequented by the bees, and the honey derived from them acts like a poison. The description by Xenophon of the intoxicating or maddening honey, which so violently affected a number of the ten thousand Greek soldiers in his celebrated retreat, has been confirmed by the observations of Tournefort; and Dr. Barton, in his account of the poisonous honey collected from the *Kalmia latifolia* by the bees in Pennsylvania, justly observes that there is more of poetry than philosophy in the following lines of Pope:—

> "In the nice bee, what sense so subtly true
> From poisonous herbs extracts the healing dew."

The honey which is swallowed by the bees passes into the crop, where it is accumulated as in a reservoir, and upon the return of the bee to the hive is regurgitated into a honey-cell. If any honey had been previously accumulated there, the bee breaks through the firm, cream-like crust which always forms upon the exposed surface of the honey, and it is this crust which maintains the honey in the horizontal cells.

The collection of the farina or pollen of flowers is a great object of the industry of bees. In large flowers, as the tulip, the bee dives in, and, if the pollen receptacle or anther be not burst, she bites it open and comes out singularly disguised, being covered over entirely with the fertilizing dust, which adheres readily to the fringed hairs of her body and legs.

Aristotle, who was well acquainted with much that is interesting in the economy of the bee, was the first to observe that a bee during each single excursion from the hive limits her visits to one species of flower. Modern naturalists have confirmed the general accuracy of this statement, and have noticed that the pollen with which a bee comes home laden is always of the same color. The necessity of this instinct arises out of the operation which the pollen first undergoes when collected by the bee. She rakes it out with incredible quickness by means of the first pair of legs, then passes it to the middle pair, which transfer it to the hind legs, by which it is wrought into little pellets. Now if the pollen were taken indiscriminately from different flowers, it is probable that the grains, being heterogeneous, would not cohere so effectually.

Certain it is that bees enter the hive, some with yellow pellets, others with orange, pink, white, or even green colored ones, but they are never observed to be party-colored. Through this instinct another important end is gained, in relation to the impregnation of flowers; the production of hybrid plants by the application of the pollen of one species to the stigma of another is avoided, while those flowers are more effectually fertilized which require the aid of insects for that purpose.

When a pollen-laden bee arrives at the hive, she generally walks or stands upon the comb beating her wings, and three or four of her fellow-citizens assist in lightening her of her load; or the laden bee puts her two hind legs into a cell, and with the intermediate pair, or the extremity of the abdomen, brushes off the pellets. These are then kneaded into a paste at the bottom of the cell, and several cells are thus filled with the packed and softened pollen, which is called bee-bread.

Besides the honey and farina, bees collect a peculiar substance like gum-resin, which was called "*propolis*" by Pliny; and this they obtain principally from the balsamic buds of the horse-chestnut, birch, and poplar, especially the *Populus balsamifera.* The propolis is soft, red, will pull out in a thread, and is aromatic. It is employed in the hive, not only in finishing the combs, but also in stopping up every chink or orifice by which cold, wet, or any enemy can enter. Like the pellets of pollen, it is carried on the posterior tibiæ, but the masses are lenticular. Having thus traced the operations of the working bees relating to the collection of the substances required in the economy of the hive, it will now be requisite to return to the larvæ, which are the immediate objects of all this industry.

The bees may be readily detected feeding the young maggot, which opens its lateral jaws to receive the bee-bread, and swallows it. The well-fed maggot soon grows too large for its tough outer skin, and accordingly casts it, when its bulk has increased so that it fills its cell; it then requires no more food, and is ready to be inclosed for the chrysalis state. The last care of the foster parents is to cover over the mouth of the cell with a substance of a light brown color, apparently a mixture of wax and farina. This takes place generally four days after the larva was excluded from the egg. The inclosed larva now begins to line the cell and covering of the aperture before mentioned with a silk, which it spins from glandular tubes similar to those of the silk-worm. When the first three seg-

ments of the trunk, to which the locomotive organs of the perfect insect are attached, begin to be enlarged, the last larva-skin splits along the back, and is pushed off from the head backwards and deposited at the bottom of the cell, and it then becomes a chrysalis. Now the wonderful changes take place, partly by a formation of new organs, partly by the development of preëxisting ones, which end at last in the completion of the perfect bee.

Mr. Hunter ascertained the duration of the pupa state of the bee to be in one instance thirteen days and twelve hours, exactly, making the period of immature life, from the first deposition of the egg, to be twenty-two days and a half, — a remarkably brief time for the completion of the metamorphoses, as compared with that in which the corresponding changes are effected in other metabolian insects. When the bee first comes forth, it is of a grayish color, but soon assumes the ordinary brown tint.

When the season of oviposition and the rearing of the larvæ is over, then the business of collecting honey seriously begins; and when the last chrysalis of the season has disclosed its image, the deserted cell is immediately filled with honey, and covered over with wax, to serve as a store for winter.

In the month of August it is supposed that the prolific female, which is to produce the swarms of the following year, is impregnated. This act takes place in the air. The queen, being preceded by the drones, traverses the exterior of the hive, and suddenly rises aloft in the air, wheeling upwards in large circles until she is out of sight. The male, unable to extricate the intromitted parts, generally perishes. The rest of this unhappy sex share a similar fate, and meet a violent death from the jaws of the unprolific females. It would seem as if the drones were conscious of their danger at this season, for they do not loiter as usual at the mouth of the hive, but hurry in or out. However, they are attacked by one, two, or three workers at a time, who do not sting them, as Huber asserts, but pinch them and pull them about as if to wear them out. From this instinctive and indiscriminate slaughter of the males it may be inferred that the impregnation of the queen has taken place before the setting in of the winter season, and that the ova, the development of which is retarded during the indolent state in which bees pass through the cold months, are in a condition to be developed and produce the

larvæ at the approach of spring. Yet, although on the setting in of the cold weather the bees remain very quiet, they are not torpid, as is the case with most other insects. They cluster as close together as the comb will permit, and have the faculty of generating a degree of heat superior to that of the external atmosphere.

Mr. Hunter found, during an evening in July, when the temperature of the atmosphere was 54°, that of the interior of a hive full of bees was 82°; and in December, the external atmosphere being 35°, the bees preserved a temperature of 73°, and what is at this season extremely rare in the lower animals, they maintain their digestive powers, and subsist on the produce of the summer and autumn. Accordingly, they are ready to take advantage of any fine and mild day, and may be seen then flying abroad, and appearing to enjoy it. They void their excrements at this time, for they are insects of singular cleanliness and propriety, and when purposely confined in the hive with abundance of food, they have been known to fall a sacrifice to this instinctive repugnance to defile the hive.

The continuance of the digestive actions during the winter influences the condition of the oviducts in the queen, and the impregnated ova begin early to expand, and are ready for exclusion towards the end of March. This makes the bee the earliest breeder among insects. The laborers now resume their accustomed duties, and as the season is too early for collecting the provision of the maggot abroad, the store of bee-bread laid up in the preceding year comes into use, for the sustenance of the larvæ, which are about to form the first swarm. As soon, however, as the flowers begin to blow, the bees fly forth to gather fresh pollen, propolis, and honey, and the labors of the year recommence.

It appears to be the presence of the larvæ which are destined to become perfect females, which stimulates the old queen to leave the hive. After repeated attempts to penetrate their cells, and destroy her royal progeny, she becomes infuriated, communicates her agitation to a portion of her subjects, which together with her rush out of the hive, and seek a new domicile. It is stated, that, in every instance, the old queen leads the first swarm; the laborers that remain pay particular attention to the royal larvæ that remain, and these, as they are successively excluded, lead away fresh swarms, if

the hive be not sufficiently enlarged. Each swarm contains, not only the recently hatched young bees, but also a portion of the old inhabitants. Some assert that the queen which leads each swarm is impregnated soon after the new colony is settled; and as this may take place early in the summer, she begins to oviposit the same year. The number of ova which are fertilized by a single coupling is prodigious. Huber calculates that the queen lays twelve thousand eggs in two months, while, according to Reaumur, she oviposits at the rate of two hundred a day. The duration of life of the different individuals of the hive varies; that of the male bee is not more than two or three months; there is more doubt respecting the longevity of the workers, but it is probable that it does not extend much beyond a year. The term of the queen's existence has been stated to have been prolonged for five years; but this is rendered improbable by the fact, that all insects of the same species have nearly the same duration of existence allotted to them.

Apis mellifica, the true honey-bee, was originally limited in its geographical range to the Old World, whence it has been transported to America, and other countries where European colonies have been established, and where it is now acclimated. The distinguished entomologist, Latreille, on whose authority it is stated, is even of opinion that the honey-bee of the South and East of Europe, as well as that of Egypt, differs specifically from the *Apis mellifica* of Western Europe.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Honey has a peculiar saccharine aromatic odor, and a sweet acidulous, sharp taste. In color, it varies from white or yellowish-white to a pretty deep shade of amber or golden-yellow. In consistence, it varies from the fluidity of limpid oil to the stiffness of soft suet, and when the more limpid kind is kept, partly crystallizes into little irregular concretions. It evidently contains sugar, mucilage, wax, and an acid, and occasionally some essential oil, as in the perfumed honey of the Crimea. Honey is soluble in water, and partially in alcohol, and, like sugar, passes into the vinous and acetous fermentation. When heated over a slow fire, it throws up a scum, and if the heat be continued, so as to produce evapo-

ration, the vapor is inflammable, and the honey becomes brown and acquires an unpleasant flavor, which is strong in proportion to the degree of temperature employed. Lowitz found that the addition of charcoal to a solution of honey deprives it of odor, taste, and color, but the color again returns when the solution is evaporated. Cavezzali separated the sugar by first melting the honey, then adding carbonate of lime (egg-shells) in powder as long as any effervescence appeared, and after separating a scum, which forms by rest, filtering it, and setting it aside to crystallize. The crystals he purified by washing them with alcohol. Proust separated it from a ready-granulated honey by the action of alcohol. The sugar of honey is of two kinds, one resembling the sugar of grapes, the other the sugar of the sugar-cane. Nitric acid converts honey into oxalic acid.

Honey is laxative, and externally detergent and stimulant. Simple honey is seldom ordered as an internal medicine; indeed, when freely eaten as food, it passes off quickly by stool, and induces colic in some habits, on which account simple sirup should perhaps be preferred in all cases for forming medicinal preparations for internal use. As a local stimulant, it is employed in glysters, and forms an excellent adjunct to gargles in cynanche and aphthous ulceration of the mouth and fauces. It is also a useful detergent to foul ulcers.

Wax, in the extended meaning of the term, may be regarded both as an animal and a vegetable product. But it is only the former species of it, or beeswax, which is officinal, and demands present consideration. It is admitted into the list of *materia medica* under two forms. I. As it is procured originally from the combs, combined with coloring-matter, or unbleached. II. Deprived of color, and purified, or bleached.

Cera flava. *Unbleached wax*, or yellow wax, is prepared immediately from the honeycomb. The honey is obtained by dripping and pressing the comb, which is then soaked for some days in clear water to extract all the remaining honey, and afterwards melted in a clean vessel with boiling water, and pressed through cloth bags. It is then remelted and cast into round cakes, in which form it is brought to market.

Good and recent yellow wax has a slight odor of honey, is insipid, and of a bright pale-yellow hue. It is brittle, yet soft, somewhat unctuous to the touch, but without adhering

to the fingers, or to the teeth when it is chewed, acquires tenacity when heated, melts at 142°, and burns entirely away. Its specific gravity varies from 0.9600 to 0.9650.

Wax in this form is often adulterated with earth, or resin and tallow. *Earth* may be suspected when the cake is very brittle, and the color inclines more to gray than bright pale-yellow; they may be separated by melting and straining the wax. The presence of *resin* may be suspected when the fracture appears smooth and shining, instead of being granulated, and it may be detected by putting small pieces of the wax in cold alcohol, which will readily dissolve the resinous part, without acting on the real wax. *Tallow* is discovered by the greater softness and unctuosity of the cake, and its disagreeable, suffocating smell when melted.

Yellow wax is scarcely ever ordered as medicine for internal use, although its coloring matter does not affect its medical properties. It is chiefly employed in the composition of external applications.

Cera alba. *Bleached wax*, or white wax. When yellow wax is exposed, with an extended surface, to the action of light and air, and sprinkled with water, the yellow color and peculiar odor are lost, and it becomes white. This process is thus performed. The yellow wax is melted with a very little water in a copper vessel, and then run off through a plug-hole in the bottom into another vessel, which is covered with a cloth to retain the heat until the water and the impurities settle. The clarified melted wax is next suffered to flow into a vessel, the bottom of which is full of small holes, through which it runs in small streams upon a cylinder kept constantly revolving over, and partly dipping in, cold water, into which the wax falls drawn out into thin shreds or ribbons, and is instantly cooled. These are spread upon cloths stretched on frames exposed to the light and air, and occasionally watered and turned, so that after some days the color nearly disappears. After being thus half bleached, the wax remains heaped up in a solid mass for a month, when the whole process is again repeated. It is, lastly, generally melted and cast into thin discs, about five inches in diameter, in which form it is found in the stores.

White wax is sometimes adulterated with white oxide of lead, in order to increase its weight, with white tallow, and with potato-starch. The first is detected by melting the wax

in water, when the oxide falls to the bottom of the vessel; white wax is known to contain tallow, when it is of a dull, opaque white, and wants the transparency which distinguishes pure wax; and starch is detected by adding to the suspected wax two per cent. of strong sulphuric acid, and then washing the mixture carefully: the acid carbonizes the starch without acting on the wax.

Pure white wax is perfectly insipid, inodorous, and somewhat translucent. It is harder, less unctuous to the touch, heavier, and less fusible than yellow wax; its specific gravity being from 0.8203 to 0.9662, and its melting point 155°. It melts into a colorless, transparent fluid, which concretes again as it cools, resuming its former appearance. Wax is perfectly insoluble in water, and nearly so in cold alcohol, although this fluid takes up about one twentieth of its weight at a boiling temperature, which, however, is again deposited as the fluid cools. Ether acts in the same manner as alcohol. Wax dissolves in the fixed oils, forming the base of cerates and ointments, and unites in some degree, when boiled, with alkalies, forming soaps. The acids at an ordinary temperature scarcely affect it. The products of its decomposition by heat, in close vessels, show that, like the fixed oils, it is a triple compound of carbon 81.607, hydrogen 13.859, and oxygen 4.534, in one hundred parts. Dr. John affirms that one hundred parts of wax digested in boiling alcohol is divided into two distinct substances, eighty parts consisting of a body soluble in hot alcohol and oils, and deposited by cooling, and thirteen of a substance completely insoluble in alcohol, the first of which he has named *cerine*, the second *myricine.*

Wax is regarded as a demulcent, and is sometimes exhibited in obstinate cases of diarrhœa and dysentery, with the view of sheathing the bowels, but its place may be better supplied by simple mucilages and gelatinous solutions. It is generally exhibited diffused in mucilaginous fluids by means of soap, in the proportion of one third part of wax, with which it is first melted, and then rubbed in a mortar with the fluid, which is gradually added: but Poerner's method, which is first to melt the wax with olive-oil, and then to mix the oily compound while hot with the mucilaginous fluid, by triturating with the yelk of an egg, is a preferable one. The dose is a cupful of the emulsion, containing about one scruple of wax, given every four or five hours.

N° 7.
MOSCHUS MOSCHIFERUS
The Musk animal.

VERTEBRATA.

Vertebrated Animals.

No. 7.

MOSCHUS MOSCHIFERUS.

THE MUSK ANIMAL.

The animal substance.	*Moschus.* *Musk.*	A medicinal agent.

Geog. Position. Asia.
Quality. Aromatic.
Power. Stimulant, antispasmodic.
Use. Spasmodic diseases, hysteria, asthma, cholera, &c.

SCIENTIFIC ANALYSIS.

Natural Classification.

5. DIVISION *Vertebrata.* CLASS *Mammalia.*

Cuvier, Règne Animale, II. Ballard and Garrod, Mat. Med. 447. Syst. Nat. Gmelin, I. 172. Pereira, Mat. Med. II. 812. Thomson, Mat. Med. 63, 510. Lond. Disp. 444. U. S. Disp. 481. Wyatt, Nat. Hist. 52. Ec. Disp. 266.

GENUS MOSCHUS.

Musc (F.), Bisam (G.), Muschio (It.), Almizcle (Sp.), Muskus (Dutch), Mysk (Swed.), Denner (Dan.), Almisca (Port.), Meshk (Arab. and Hind.), Castorie (Tam.), Mesk (Pers.), Jebat (Malay), Rutta Oorrola (Cyng.), Ziakoo (Japanese).

THE ESSENTIAL CHARACTERS.

Incisors none in the upper jaw, in the lower usually eight. A vacant space between the incisors and molars, but in which in some genera are found one or two canines. *Molars* twelve in each jaw, the crown marked with two double crescents of enamel, of which the convexity is universally outwards in the lower jaw, and inwards in the upper.

Clavicles none. *Extremities* disposed for walking. Two *toes* furnished with hoofs, metacarpal and metatarsal bones united.

Stomachs four; the first and largest is called the *paunch*, the second the *bonnet*, the third the *leaflet*, and the fourth the *rennet*. *Intestines* long.

Mammæ two or four, inguinal.

Horns in the male, and frequently in the female, of most species.

The Secondary Characters.

Moschus. A long *canine* on each side of the upper jaw and projecting from the mouth in the males. *Canines* wanting altogether in the females. *Body* slender. *Ears* long and pointed. *Feet* small, with hoofs separated and enveloping the last phalanges. *Tail* very short. Two inguinal *mammæ.* No lachrymal apparatus.

The Specific Characters.

Moschus moschiferus. *Fur* of a gray brown. *Hair* coarse. *Size* of the roebuck. A *pouch* placed under the belly and before the prepuce of the male, in which is inclosed a strong, unctuous musky substance.

NATURAL HISTORY.

Moschus moschiferus. *The musk deer* inhabits the vast mountainous regions of Central Asia extending from India to Siberia, and from the country of the Turcomans to China. It is an active and timid animal, springing from rock to rock with surprising agility, and frequenting the snowy recesses and most inaccessible crags of the mountains. Concealing itself during the day, it chooses the night for roaming in search of food, and though said to be abundant in its native regions is taken with difficulty. The length of the full-grown animal scarcely ever exceeds three feet, and in its general aspect it resembles the deer; the head is not very unlike that of a hog, the eyes are black and full, and, projecting from the upper jaw, the teeth hang pointing downwards over the lower jaw; the fleece is coarser than that of the stag, but very light and soft, and varying in color at different seasons of the year and different periods of life, chiefly from brown to nearly black, hoary underneath and sometimes, but rarely, whitish. The tail is very short. Close to the skin, at the posterior part of the abdomen of the animal, is an oval bag, flat on one side and convex on the other. It is situated under the skin, and opens exteriorly by a small aperture immediately in front of the preputial orifice. It is an appendage only of the males. On the convex side it is covered with stiff hairs, but on the flat surface, which is applied to the abdomen of the animal, it is a naked membrane. The bag is lined with an irregularly plaited membrane, in depressions of which are the glands that secrete the

musk, which during the life of the animal is soft, unctuous, in irregular reddish-brown granules. The quantity in the bag varies; in the young animal it is empty and contracted, in the adult it contains about a drachm and a half of musk, and in old animals more than two drachms. But these quantities must be below the average, since the dried pods of commerce contain, on the average, more musk than this. The animal itself often expresses part of the contents of the bag when it becomes too full, by rubbing itself against stones, and the matter thus ejected is said to be a purer musk than that which is brought to market. The bag is generally cut from the animal while it is yet alive, and an idea prevails that the animal must be caught alive in order to obtain the musk, which is said to be absorbed and lost if the deer be shot. As soon as the bag is cut away, a small hollow reed is inserted into it that the musk may not suffer, which it would be apt to do from want of air, and the whole is tied around with a sinew of the animal.

Various methods of catching the animals are adopted. Sometimes they are taken by snares or gins, sometimes by pitfalls, sometimes by shooting them. The Tungouses, one of the native tribes of Siberia, employ the bow and arrow only.

Two kinds of musk are found in the market. One, the Tonquin or Chinese, has the bag covered with reddish or cinnamon-colored hairs. The other, called the Kabardine or Russian, is covered with coarse white hair. The Tonquin or Chinese is the best. This is imported in small rectangular boxes or *caddies*, covered externally by silk, and lined with sheet-lead and paper. These boxes contain from twenty to sixty and one hundred ounces each, in sacs or pods separately wrapped in paper. These natural follicles or pods are roundish or somewhat oval, generally broader at one end than at the other. The hairs are brownish-yellow, or grayish, or whitish, bristle-like and stiff, arranged in a concentric manner around the orifice of the sac. The weight of each pod, as well as of the contained musk, is very variable.

The Kabardine or Russian musk is an inferior kind. The pods are said to be more oblong or oval than those of the Chinese kind, the hairs longer and whiter. The odor is much less powerful, and more nauseous and disagreeable, being somewhat empyreumatic. Geiger says it is sometimes accompanied by an odor similar to that of the sweat of a horse.

This kind of musk is imported in wooden boxes, and sometimes not in a good state of preservation.

The high price of musk is a strong inducement for its adulteration, and this is not confined to the grain musk. When adulterated, the bag, which should not have any appearance of having been opened, appears, if narrowly examined, slit or punctured in several places, through which sand, lead, and other heavy matters, are inserted. The musk is sometimes nearly all abstracted, and a mixture of dried blood and asphaltum introduced into the bag; or both the bag and the musk are artificial, and only scented with real musk. The blood of the animal itself is often injected into the bag of musk, while both are warm, and they then unite. The first of these adulterations is easily detected. The presence of blood may be suspected, if the musk, when held over the flame of a candle on a thin spatula, emits as it inflames a fetid smoke; and asphaltum is discovered by its melting and running before it inflames, if heated on a spatula: whereas real musk inflames without running, and is converted into charcoal. The artificial bags are known by the inner membrane, which lines the real musk-bags, being deficient. *Grain musk* is sometimes imitated by dried blood, and perhaps by other substances. The fraud is to be detected by a careful examination of the appearance and odor of the particles, and by their chemical characters. An infusion of genuine musk gives *no* precipitate with a solution of bichloride of mercury, but does with tincture of nutgalls and acetate of lead. By incineration, genuine musk leaves behind a grayish-white ash, whereas blood yields a reddish one. *Artificial musk* is said to be prepared by rubbing in a mortar dried bullock's blood with caustic ammonia, and mixing the half-dried mass with genuine musk.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

The odor of Musk is aromatic, but peculiar, extremely powerful, and durable. In many individuals the odor of musk causes headache, and in some instances, when it is strong, convulsions. The taste is bitterish and heavy, and the color a deep brown, with a shade of red. Exposed to heat it burns with a white flame, and leaves a light, spongy charcoal. Trituration with potassa develops ammonia. Boil-

ing water dissolves about eighty parts, alcohol only fifty, but sulphuric ether completely. The watery *infusion* has a yellowish-brown color, a bitterish taste, and the strong odor of the musk, and reddens infusion of litmus. Solutions of oxymuriate of mercury and of sulphate of iron produce with it copious precipitates, as does also infusion of yellow cinchona bark. Solution of nitrate of silver throws down a whitish precipitate, which, on exposure to the light, changes to a livid blue, and nitrate of mercury produces a brownish precipitate. The *alcoholic tincture* is of a reddish-brown color, transparent, but with scarcely any odor of the musk. Water renders it milky, and gives out the strong musk odor; but with the other test, it presents the same results as the watery infusion. The ethereal tincture has a deep brown color, and when evaporated on the surface of water deposits a brown, tenacious, nearly insipid resin, and renders the water milky. The resinous matter has the musk odor in perfection, while the substance which occasions the turbidness of the water possesses the properties of extractive. From these results, musk appears to contain albumen, gluten, muriate of soda, phosphate of soda, and an uncombined acid, but the greater part of it consists of a resin, combined with a volatile oil and a mucilaginous extractive matter. According to the analysis of Blondeau and Guibourt, and that of Geiger and Reinmann, musk consists of *stearine*, *elaine*, *cholesterine*, an *acid oil* combined with ammonia, *free ammonia*, *muriates of ammonia*, *potassa*, and *lime*, an undetermined *acid* combined with *ammonia*, *potassa*, and *lime*; *gelatine*, *albumen*, *fibrine*, *carbonized matter*, soluble in water; *carbonate* and *phosphate of lime*, and water, and a peculiar *bitter resin*, which can be readily separated by ether, from which it is deposited on the surface of the water.

The odor of musk can scarcely be called peculiar, since it is common to several animals and vegetables. Thus the *musk-ox* and the *musk* or *civet cat* evolve it. Among plants Erodium moschatum, *the musk geranium*, Malva moschata, *the musk mallows*, and Centaurea moschata, *the sweet sultana*, may be referred to as possessing a musky odor. When mixed with other scents, musk has the remarkable property of augmenting and improving their smell, without much imparting its own; hence it is extensively used by perfumers. A few drops of potash added to musk increases its odor, by setting free, it is supposed, ammonia.

Musk is stimulant and antispasmodic. Aëtius is the first writer who mentions it as a medicine, but it did not come into general use till the beginning of the sixteenth century. In moderate doses it operates on the nerves of the stomach, causing, when this organ is in an irritable state, nausea and a sensation of heat at the epigastrium. If the dose be repeated at short intervals, it acts as a general excitant and antispasmodic, increasing the force and quickness of the circulation, and exciting perspiration. It is taken into the blood, and the odor of the drug becomes evident in the urine, the sweat, and other excretions, and in post-mortem dissections of persons under a course of musk, every cavity and tissue is found to be penetrated by it. From the report of M. Jorg and a society of experimentalists at Leipzig, the primary influence of musk appears to be that of an excitant on the stomach, causing increase of appetite, dryness of the gullet, and eructations; the secondary, on the nervous centres, causing vertigo, headache, nausea, drowsiness, and a general sensation of heaviness and faintness.

Musk has a remarkable power of resolving spasm and increasing the energy of the brain and nerves. Hence it is very efficaciously given in typhoid fevers, when low delirium, subsultus tendinum, and hiccough supervene; and in combination with ammonia to arrest the progress of gangrene. Its beneficial effects in all spasmodic diseases are well established, and Dr. Cullen says he can vouch for its powers in retrocedent gout, which in many instances he had seen suddenly relieved by large doses of musk. It checks the vomiting in cholera, at the same time that it allays the termina of the intestines. In epilepsy, more benefit has been derived from musk in combination with calomel than from any other remedy, and much of the disappointment which others have experienced may be attributed either to the remedy not having been genuine, or to the smallness of the dose. To obtain the full benefit of musk in this disease, the dose must be much larger than that which is usually given, it should be repeated at shorter intervals, and its use be continued for a longer period.

It may be given in the form of pill or emulsion. The medium dose is ten grains, to be repeated every two or three hours. In the cases of children, it may be given with great advantage in the form of enema.


Lith. of E. C. Kellogg. Hartford, Conn.

N° 8.
PHYSETER MACROCEPHALUS.
Spermaceti Whale or Great headed Cachalot

VERTEBRATA.

Vertebrated Animals.

No. 8.

PHYSETER MACROCEPHALUS.

SPERMACETI WHALE, OR GREAT-HEADED CACHALOT.

The animal substance. *Cetaceum.* *Spermaceti.* A medicinal agent.

Geog. Position. Southern seas.

Quality. Inodorous, insipid.

Power. Emollient, demulcent.

Use. Diarrhœa, dysentery, catarrh, and in the preparation of cerates and ointments.

SCIENTIFIC ANALYSIS.

Natural Classification.

5. Division *Vertebrata.* Class *Mammalia.*

Ballard and Garrod, Mat. Med. 450. Syst. Nat. Gmelin, I. 227. Pereira, Mat. Med. II. 809. Thomson, Mat. Med. 70, 1174. Lond. Disp. 490. U. S. Disp. 209. Wyatt, Nat. Hist. 55. Ec. Disp. U. S. 117.

Genus PHYSETER.

Spermaceti, Cétine (Fr.), Wallrath (Ger.), Spermaceti (It.), Espermaceti (Sp.), Walschot (Dutch).

The Essential Characters.

Body pisciform, terminated by a caudal appendage, cartilaginous and horizontal.

Fins, two anterior extremities formed similar to, having the bones which form them flattened and very soft.

Head joined to the body by a very short, thick neck.

Mammæ two, pectoral or abdominal.

Ears with very small external openings.

Brains large.

Pelvis and *bones* of the posterior extremities represented by two rudimentary bones lost in the flesh.

The Secondary Characters.

Physeter. Inferior *teeth* eighteen to twenty-three on each side of the jaw. *Upper jaw* broad, elevated, without teeth, or with these short and concealed in the gum. *Lower jaw* elongated, narrow, corresponding to a furrow of the upper, and armed with thick and conical teeth, entering into corresponding cavities in the upper jaw. *Spiracular orifices* united at the upper part of the snout. A *dorsal* fin in some species, a simple eminence in others. *Cartilaginous cavities* in the superior region of the head, filled with oily matter.

The Specific Characters.

Physeter macrocephalus. Lower *teeth* twenty to twenty-three on each side, recurved and pointed at the extremity. Small conical teeth concealed in the upper gums. *Tail* narrow and conical. A *longitudinal eminence* on the back above the anus. Upper part of body blackish or slate-blue, a little spotted with white. *Belly* whitish. *Length* forty-five to sixty feet.

NATURAL HISTORY.

The grand classical characters which Nature has imprinted on the cetaceous order will, in a philosophical view, vindicate their arrangement among the Mammalia. Their internal structure agrees in every respect with that of the *Mammalia* of Cuvier, and their external conformation also is in some other parts similar. Being destitute of gills, they breathe by means of lungs, which obliges them frequently to rise to the surface of the water for fresh air. Another great resemblance to the Mammalia is their having warm blood, and being provided with mammæ, with which they suckle their young.

The Physeter macrocephalus inhabits chiefly the Southern Ocean, although occasionally it is found in the European seas. It is a large fish, generally measuring about sixty feet in length and thirty in circumference at the thickest part of the head, which is blunt and about nine feet in height. Notwithstanding its prodigious length, the snout is formed only by the maxillæ on the sides, by the intermaxillæ towards the median line, and by the vomer on this line. The intermaxillæ project to form the anterior part of the snout. Posteriorly, the right one ascends higher than the left. The spout-hole is single (in most it is double), and directed towards the left side,

so that whenever the animal spouts water it is to that side only. The upper part of the body is of a blackish color, and the belly white. There are forty-six double teeth in the lower jaw, which is shorter than the upper, and in the head is a triangular, bony cavity, covered by the common integuments only, and filled with an oily fluid, which on the death of the fish congeals into a spongy mass. The eyes are small, the pectoral fins near the angles of the mouth, and the tail forked.

Spermaceti is found in several parts of the body of the animal, mixed with the common fat. The head, however, is the grand reservoir for it. Here it is found (mixed with oil), in a large excavation of the upper jaw, anterior to, and quite distinct from, the true cranium which contains the brain. Mr. Hunter (*Phil. Trans.*, Vol. LXXVII. p. 390) states that the spermaceti and oil are contained in cells, or a cellular membrane, in the same manner as the fat in other animals; but that, besides the common cells, there are larger ones, or ligamentous partitions going across, the better to support the vast load of oil, of which the bulk of the head is principally made up. An ordinary-sized whale will yield upwards of twelve large barrels of crude spermaceti.

There are two places in the head where this oil lies; these are situated along its upper and lower part; between them pass the nostrils, and a vast number of tendons going to the nose and different parts of the head. The purest spermaceti is contained in the smallest and least ligamentous cells. It lies above the nostril, along the upper part of the head, immediately under the skin and common adipose membrane. These cells resemble those which contain the common fat in the other parts of the body nearest the skin. That which lies above the roof of the mouth, or between it and the nostrils, is more intermixed with a ligamentous cellular membrane, and lies in chambers whose partitions are perpendicular. These chambers are smaller the nearer to the nose, increasing towards the back part of the head, where the spermaceti is more pure.

Mr. Hunter discovered about the nose, or anterior part of the nostril, a great many vessels having the appearance of a plexus of veins, some as large as a finger. On examining them they were found loaded with spermaceti and oil, and some had corresponding arteries. They were most probably lymphatics, whose contents had been absorbed from the cells of the head.

In the right side of the nose and upper surface of the head of

the whale is a triangular-shaped cavity, called by the whalers "*the case.*" Into this the whalers make an opening, and take out the liquid contents (oil and spermaceti) by a bucket. The dense mass of cellular tissue beneath the case and nostril, and which is technically called "*junk*," also contains spermaceti, with which and oil its tissue is infiltrated. The spermaceti from the case is carefully boiled alone and placed in separate casks, when it is called "*head-matter.*" The substance called head-matter consists of spermaceti and sperm oil. Its color is yellow. Its consistence varies with the temperature. In cold weather it consists of a congealed mass (spermaceti) surrounded and infiltrated by oil. To separate the latter as much as possible, the mass is put into hair bags and pressed between two plates of iron, in a screw-press, until it becomes hard and brittle. It is then broken in pieces and thrown into boiling water, where it melts, and the impurities rising to the surface are skimmed off. After being cooled and separated from the water, it is put into fresh water in a large boiler, and a weak lye of the potassa of commerce added to it by degrees. This part of the process is thrice repeated, and the whole poured into coolers, where the spermaceti concretes into a white, semitransparent mass, which, on being cut into small pieces, assumes the flaky aspect it has in the stores.

The Spermaceti whale or Cachalot resembles in size and appearance the Large Whalebone whale (*Balæna mysticetus*), the value of which to man is such, that large fleets are annually fitted out expressly for its capture. The food of the whale consists exclusively of small molluscous and crustaceous animals, but chiefly the *Clio borealis*, and as these animals abound only in the Arctic seas, the whale cannot be expected to frequent for any length of time those latitudes in which its food is scarce or altogether wanting. The annual destruction of the *Balæna mysticetus* has greatly diminished its numbers, and driven it to the extremest limits of the Northern seas, where its means of subsistence can be obtained.

The Large Whalebone whale is often spoken of as the largest of existing animals, but it is inferior in magnitude to the Small Whalebone whale (*Balænoptera*). The latter attains the length of from ninety to one hundred feet, while the ordinary dimensions of the true whale are from fifty to sixty feet in length, and from thirty to forty feet in circumference. The terms "Large Whalebone" and "Small Whalebone" relate to

the size of the whalebone or baleen-plates, which are always much greater in the genus *Balæna* than in *Balænoptera*, and it is this structure combined with the greater amount of blubber in the true whale, which renders it an object of so much more value to the whale-catchers, while its less courageous habits, and less violent efforts to escape when wounded, make it a more sure and safe prey than the Small Whalebone whale.

The plates of whalebone are the substitutes for teeth in the mouth; they have a similar mode of development from a pulp and external membrane, and differ only in form, and in a less proportion of earthy matter in their composition. They are arranged vertically and transversely, in two series, consisting each of three hundred plates, descending from the palatal surface of the upper jaw, and terminating in a fringe of coarse hairs on their oblique and inner margins, which is in contact with the upper surface of the bulky tongue when the mouth is closed. The mechanism of the seine is thus realized on an enormous scale, and while the water gulped at each successive mouthful is drained off through the interstices of the baleen-plates, the molluscous and crustaceous animals are retained, bruised into a pulp between the muscular tongue and coarse fibres of the whalebone, and swallowed. The area of the gullet corresponds with the minute character of the food, and is relatively smaller in the whale than in any other animal. The stomach is divided into four cavities; the intestinal canal is long and narrow, and provided with a short and simple cæcum.

The whale has usually but one young at a birth, and brings forth in the early spring. The period of gestation is unknown, that of suckling lasts a year. In this stage of their growth, the young are called *short-heads* by the whale-fishers; at two years old, and until able to find their appropriate food in due abundance, they are termed *stunts;* when they begin to get fat, and until they attain their full size, they are called *skull-fish.*

The interesting details of the profitable but perilous occupation of whale-fishing will be found most amply and correctly given in Scoresby's *Account of the Arctic Regions.* The baleen and blubber are the only parts of the animal of any commercial value, and the quantity of both yielded by these enormous animals is of course considerable. The length of the largest whalebone plates in a whale of sixty feet is as much as twelve feet, and the blubber of such a one will yield more than twenty tuns of pure oil, the proportion of oil to the blubber

from which it is extracted being as three to four. The blubber is principally accumulated at the circumference of the body, beneath and in the extended tissue of the skin; an immense quantity of fine oil is also lodged in the cellular substance of the tongue, and the coarse and porous bones, particularly the lower jaw, are full of pure oil.

The common whale oil and the oil of other cetaceous animals contain small quantities of spermaceti, which they slowly deposit on long standing; and this is also the case in a moderate degree with the oil of all fishes, whether breathing by lungs and mammiferous, or breathing by gills.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Spermaceti is in white, pearly, semitransparent masses, of a crystalline foliaceous texture, friable, soft, and somewhat unctuous to the touch, slightly odorous, insipid, specific gravity 0.943, fusible at 112° *Fahrenheit*, volatilizable at a higher temperature without change *in vacuo*, but partially decomposed if the air is admitted, inflammable, insoluble in water, soluble in small proportion in boiling alcohol, ether, or oil of turpentine, but deposited as the liquids cool, readily soluble in the fixed oils, not affected by the mineral acids, except the sulphuric, which decomposes and dissolves it, rendered yellowish and rancid by long exposure to hot air, but capable of being again purified by washing with a warm lye of potash. By the agency of the alkalies, it is with difficulty saponified, being converted into an acid called by MM. Dumas and Stass *ethalic acid*, and a peculiar principle named *ethal* by Chevreul. Spermaceti, when quite pure, may be considered either as a compound of ethalic acid and ethal, or as a distinct substance which is resolved into these two by reaction with alkaline solutions. (*Annal. der Chem. und Pharm.*, XLIII. 241.) The name of *cetin* was proposed for it in this state by Chevreul. As found in the stores it is not entirely pure, containing a fixed oil and often a peculiar coloring principle. From these it is separated by boiling in alcohol, which on cooling deposits the *cetin* in crystalline scales. Thus purified, it does not melt under 120° *Fahrenheit*, is soluble in forty parts of boiling alcohol of the specific gravity 0.821, and is harder, more shining, and less unctuous than ordinary spermaceti. The ultimate constituents of spermaceti are carbon, hydrogen, and oxygen; and its formula according to Dumas $C_{32}\ H_{33}\ O$.

Spermaceti is employed as a demulcent and emollient, though scarcely more valuable as a remedy than gelatine. It is readily digested in the stomach, in the same manner as animal fat, and is converted into chyle with equal facility as any other animal matter. It is used in dysentery and irritations of the alimentary canal, and in catarrh and phthisis, but in the latter case it is less beneficial than the bland oils, for as these are readily united with water by means of alkalies and mucilages, the compounds formed with them are more viscid, and better adapted for smearing the fauces. Several imaginary healing virtues were formerly supposed to belong to spermaceti, on which account it was and still is sometimes given and regarded as highly beneficial in affections of the chest, the kidneys, and the uterus. It is often likewise prescribed as a vehicle for preparations of opium and sedatives after child-birth. It is not here intended to perpetuate error, and as an internal remedy experience has decided against the claims of this substance. Its chief use is in the formation of ointments.

Ceratum cetacei, *U. S.*, *Lond.* Ceratum simplex, *Ed.* Unguentum cetacei, *Dub.* *Spermaceti cerate.* "Take of spermaceti *an ounce*; white wax *three ounces;* olive-oil *six fluid ounces.* Melt together the spermaceti and wax, then add the oil previously heated, and stir the mixture till cool." *U. S.*

The London College directs *two ounces* of spermaceti, *eight ounces* of white wax, and *a pint* (Imperial measure) of olive-oil. *The Edinburgh College* directs *six parts* of olive-oil, *three parts* of white wax, and *one part* of spermaceti. *The Dublin College* directs *half a pound* of white wax, *a pound* of spermaceti, and *three pounds* of lard. The direction to heat the oil before adding it to the other ingredients is peculiar to the United States and Edinburgh Pharmacopœias. If added cold, it is apt to produce an irregular congelation of the wax and spermaceti, and thus to render the preparation lumpy.

This cerate is employed as a dressing for blisters, excoriated surfaces, and wounds; and as the basis of more active preparations. When the ingredients are pure and sweet, it is perfectly free from irritating properties.

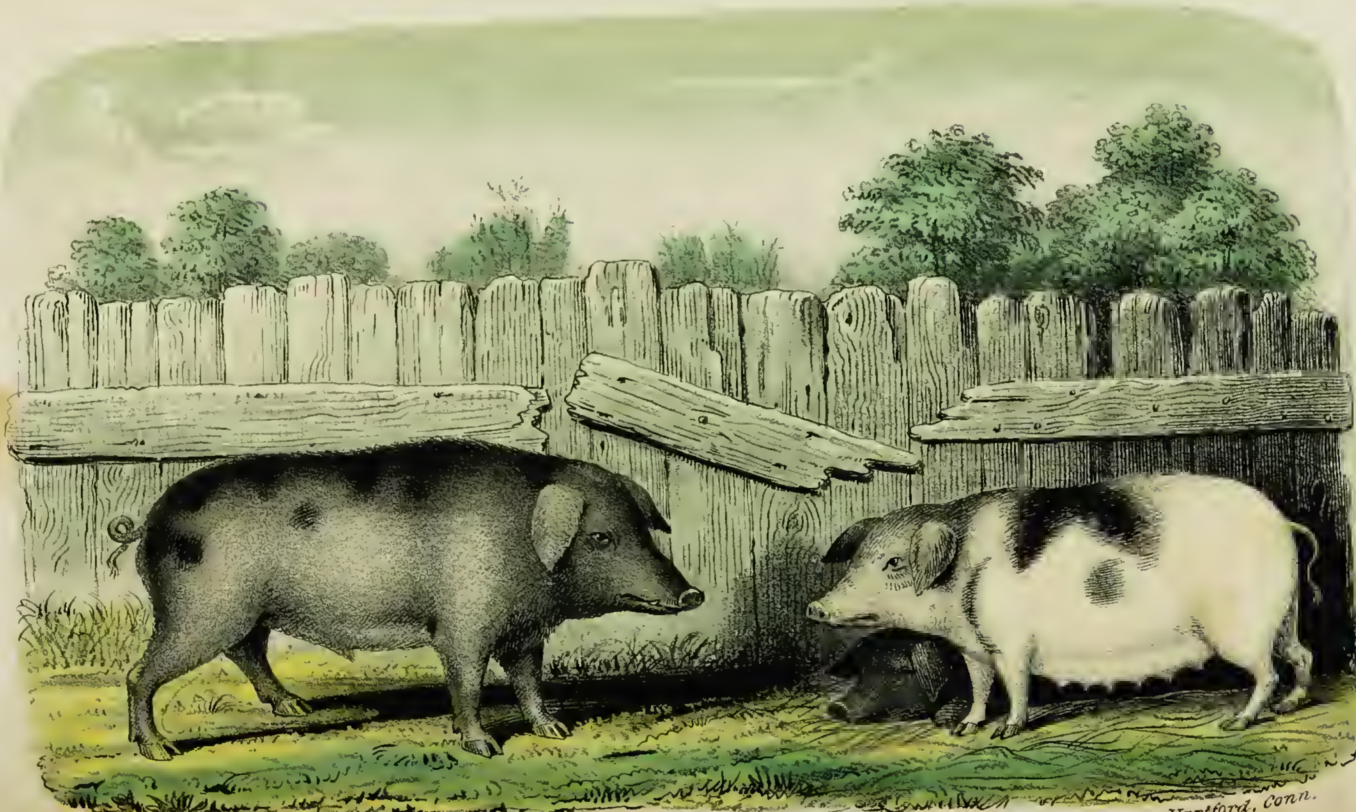
Unguentum cetacei, *Lond.* *Spermaceti ointment.* "Take of spermaceti *five ounces*, white wax *fourteen drachms*, olive-oil a pint (Imperial measure) or *a sufficient quantity.* Melt them together over a slow fire, and stir constantly until cold." *Lond.*

This ointment is employed as a mild dressing for blisters, wounds, and excoriated surfaces. It should be made in small quantities, as it is apt to become rancid when long kept.

AMBERGRIS. *Ambra grisea.* This substance, which is found floating on the waters of the sea, or thrown by the waves upon the shores of various countries, particularly in the Southern hemisphere, is now very generally believed to be produced in the intestines of the PHYSETER MACROCEPHALUS, *Spermaceti whale* or *Great-headed Cachalot*, and perhaps also in those of some other fish. It appears to be the indurated fæces (perhaps somewhat altered by disease) of the animal. Mr. Beale collected some of the semifluid fæces, and found that the dried mass had all the properties of ambergris. In the United States it is used as a perfume only, in Europe it is employed in medicine. It is in roundish or amorphous pieces, usually small, but masses have been found weighing fifty, a hundred, or even two hundred pounds. These pieces are often composed of concentric layers. They are of various colors, usually gray, with brownish-yellow and white streaks, often dark brown or blackish on the external surface. They are opaque, lighter than water, and of a consistence like that of wax.

Ambergris has a peculiar aromatic, agreeable odor, is almost tasteless, softens with the warmth of the hand, melts under 212°, is almost completely volatilizable by heat, and is inflammable. It is insoluble in water, but is readily dissolved with the aid of heat, by alcohol, ether, and the volatile and fixed oils. It consists chiefly of a peculiar fatty matter, analogous to cholesterin, and denominated by Pelletier and Caventon *ambrein.* This may be obtained by treating ambergris with heated alcohol, filtering the solution, and allowing it to stand. Crystals of ambrein are deposited. It differs from most other fatty matters in not forming soaps with the alkalies. When pure it has little or no odor.

Ambergris is often adulterated, but does not then exhibit its ordinary fusibility and volatility. It was long regarded as a cordial and antispasmodic, somewhat analogous to musk, and has been recommended in typhoid fevers, and various nervous diseases. It formerly entered into many officinal preparations, and is still retained in some of the European Pharmacopœias. It is, however, feeble as a remedy, and is much more used in perfumery than in medicine. The dose is from five grains to a drachm.



Lith of E.C Kellogg

Hartford, Conn.

Nº 9

SUS SEROFA.

The Hog.

VERTEBRATA.

Vertebrated Animals.

No. 9.

SUS SCROFA.

THE HOG.

The animal substance. *Adeps, Lard. Lard Oil.* A medicinal agent.

Geog. Position. Temperate parts of Europe and Asia, northern parts of Africa, America, &c.

Quality. Little or no taste or odor.

Power. Demulcent, emollient.

Use. Preferable to fat as a friction; ingredient of ointments and cerates.

SCIENTIFIC ANALYSIS.

Natural Classification.

5. Division *Vertebrata.* Class *Mammalia.*

Ballard and Garrod, Mat. Med. 449. Syst. Nat. Gmelin, I. 217. Jones, An. King. 15. Pereira, Mat. Med. II. 823. Thomson, Mat. Med. 81. Lond. Disp. 615. U. S. Disp. 57. Wyatt, Nat. Hist. 49. Ec. Disp. U. S. 29. Farmers' Encyc. *Articles* Swine, Lard.

Genus SUS.

Axonge, Graisse, Saindoux (Fr.), Schweineschmalz (Ger.), Grasso di porco, Lardo (It.), Pingue, Mantera de puerco, Lardo (Sp.), Swinster (Swed.), Szmalee (Pol.), Punnie Colupoo (Tam.), Booboo (Beg.).

The Essential Characters.

Teeth, three kinds in the greatest number, in the rest at least two sorts.

Extremities four, with the *toes* variable in number, and furnished with strong *nails* or *hoofs.*

Clavicles, none.

Organs of digestion simple or divided into several pouches, not disposed for ruminating.

Skin thick, naked, or nearly so.

The Secondary Characters.

Sus. *Incisors* varying in number, canines curved upwards and laterally, *molars* with tuberculous crowns, lower *incisors* bent forwards. Four *toes* on all the feet, the two middle ones

large and with strong hoofs, the two exterior ones much shorter and not touching the earth. *Muzzle* truncated and terminated by a *snout*, elongated, cartilaginous. *Body* covered with bristles. *Teats* twelve.

The Specific Characters.

Sus scrofa. *Tusks* strong, triangular, directed laterally. No protuberance under the eyes. *Color* blackish-gray in the wild animal, but varying much in the domesticated races.

NATURAL HISTORY.

The Hog has been generally described as a creature of gross habits and unclean tastes, as having the senses of touch and taste obtuse, and even as being so insensible that mice may burrow in his skin without his seeming to feel it. But these opinions are most unjust and incorrect. Far from being unclean, nature has furnished him with powerful organs of digestion, enabling him to derive sustenance from a variety of substances, and his voracity is only the result of the extent and perfection of his digestive and respiratory organs. Although one of the pachydermatous or thick-skinned animals, the hog feels blows acutely, and manifests his sufferings by loud cries. Indeed, the inference that his sense of touch is dull, because of the thick layer of fat with which his body is enveloped, is most erroneous, for it is well known that the plexus of nerves which gives sensibility to the body is exterior to this fatty layer. So far from being insensible to pain, the hog even suffers under the irritation arising from the punctures of gnats, mosquitos, and other small insects, and endeavors to protect himself from their persecution by rolling in moist places and covering himself with mud.

The hog is subject to remarkable changes of form and characters, according to the situations in which he is placed. When these characters assume a certain degree of permanence, a breed or variety is formed, and there is none of the domestic animals which more easily receives the characters we desire to impress upon it. This arises from its rapid powers of increase, and the constancy with which the characters of the parents are reproduced in the progeny. There is no kind of live stock that can be so easily improved by the breeder, and so quickly rendered suited to the purposes required: and the same characters of external form indicate in the hog a dispo-

sition to arrive at early maturity of muscle and fat, as in the ox and sheep. The body is large in proportion to the limbs, or in other words, the limbs are short in proportion to the body, the extremities are free from coarseness, the chest is broad and the trunk round. Possessing these characters, the hog never fails to arrive at earlier maturity, and with a smaller consumption of food, than when he possesses a different conformation.

The true hog does not appear to have been indigenous to America, but was brought over by the early voyagers from the Old World, and it has now spread and multiplied throughout the continent. The first settlers of Canada, the British North American settlements, and the United States, carried with them the swine of the parent country, and a few of the breeds still retain traces of the old English character. From its nature and habits, the hog was the most profitable and useful of all the animals bred by the early settlers in the distant clearings. It was his surest resource during his first years of toil and hardship. It arrived earlier at maturity, required less care, sought out for the most part its own food, was the least subject to accidents and diseases in a new situation, and therefore best repaid any portion of attention bestowed on the breeding and rearing of it.

The widely extended foreign commerce of the Americans afforded opportunities of procuring the varieties from China, Africa, and other countries. The large consumption of pork in the United States, far exceeding the consumption of any other country, has also contributed mainly to the improvement of the breeds, by causing the farmers of the different States to pay considerable attention to the rearing of swine, which have thus become one of the most important articles of commerce, and a source of profit to the breeder on a large scale.

The various breeds which have been reared by crosses between those procured from different countries are so numerous, that to give any thing like a detailed description of all would require more room than our plan will permit us to occupy. We shall therefore give a short notice only of those which are either considered as the origin of some peculiar race, or most generally bred for their fattening or other profitable qualities.

The original native breeds of Great Britain may be arranged into two general classes; but between these extremes there are so many varieties, that numbers cannot be reduced to either class.

I. Those of small size, with the ears erect or partly so, of which the most marked are those of the Highlands and islands of Scotland. They are hardy creatures, usually of a dusky-brown color, having an arched back, with coarse bristles on the neck and spine, and approximate closely in character and habits to the wild hog. They are, for the most part, left to provide for themselves, ranging at large, grubbing up roots and destroying the eggs of birds, and even newly born lambs, when they come in their way. These hogs are usually very meagre and thin; the flesh is coarse and fibrous, but it is greatly improved when the animals are confined and properly fed.

II. The second class comprises those of a larger body, with long, pendent ears.

Although their color varies considerably, they are, for the most part, white, or white spotted with black. The characteristics of this old race, where it exists without intermixture with foreign blood (which is very seldom the case), are a huge, uncouth form, large bones, long limbs, arched and narrow back, low shoulder, and long snout, with the ears large and flapping, covering the greater part of the face. They consume much food, are slow feeders, and their only recommendation is that of being prolific breeders, and attaining to a large size, when fattened at the age of two or three years. The old English breed, and many other once celebrated local races of that country, have all had their distinctive characters more or less effaced by crossing.

The varieties of the Chinese or Siamese breed are a widely extended race, and the most common in England. They were brought to England and America from Canton and other Indian ports, for the most part as sea-stock, by the vessels employed in the tea trade, &c. Owing to the much larger consumption of pork by the Chinese than of any other animal food, they pay great attention to the rearing and fattening of their swine. It is said, they even use the milk of the sow for domestic purposes. The pure Chinese breed is too delicate and sensitive to frequent changes of temperature. It is chiefly, therefore, by intermixture that its value is recognized, and it is for this reason that its introduction has proved so beneficial in the Eastern States, by correcting the coarseness of form, quieting the restless disposition, and adding a greater tendency to mature quickly and fatten kindly.

The rearing and fattening of the hog present little diffi-

culty, for this animal is reared equally well on a small or a large scale; by the cottager, from the wash and refuse of his house and garden, or by the extensive breeder, who has abundance and more variety of food at command. There is, however, much difference of opinion as to the best age for breeding-sows. Some consider that sows at three years old throw their stock much larger and stronger than when at a less age; while others are of opinion, that they are never such good breeders as at the age of from a year and a half to two years and a half old, after which they throw the pigs unevenly.

The practice of ringing swine, which was usually performed at the time of weaning, is growing into disuse, and the ringing is not advisable, inasmuch as it not only proves painful to the animal, but troublesome to the owner, for it frequently happens that the ring breaks, or is worn out, the cartilage gives way, and the ring has to be as often replaced by a fresh operation. A more preferable and lasting process is now adopted, which consists in either cutting the two strong tendons of the snout (the cartilaginous and ligamentous prolongations) about an inch and a half from the nose, by a slight incision with a sharp knife, or else to shave or pare off the gristle on the top of the nose, which may be done without prejudice to the animal, when about two or three months old. The place heals over in a short time, and the animals are thus prevented from grubbing or tearing up the ground.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

The Pig, for its size, is one of the most useful animals in the whole creation. He is food from top to toe, and there is no part of him which cannot be turned to account. His fat is made into lard, much used for domestic purposes and in cookery, for ointments, pomatums, and other purposes. The flesh is eaten fresh when young; that of the adult animal, or bacon hog, is salted in brine or with dry salt, and then either kept moist, as *pickled pork;* or merely dried, *white bacon;* or cured, dried, and smoked, *bacon;* that of the hind legs, *ham*, is equally nutritive, but less easily digested; the collar and head of the old boars are made into *brawn.* The skin or rind is eaten with the flesh, if not smoked, and it is also tanned for saddle-seats, shoes, covers for pocketbooks, &c. The bladders are prepared like ox-bladders. The bristles clean our teeth and

brush our clothes. The abdominal fat is used, as also the blood, for food, and it yields a bezoar, principally from a morbid concretion in the stomach of the wild hog. Even the intestines are used for chitterlings, and converted into an inferior kind of lard, by being cut open and washed clean, and (after the water is well pressed out of them) melted in the same way as lard; this substance is very useful for making common candles, greasing wheels, and other general purposes. And, to sum up all, the hog multiplies his species in a degree proportioned to his usefulness.

The flesh of the hog, when fresh, is easy of digestion and nutritive, but it is not a food capable of being eaten for a length of time with impunity. It favors obesity, and occasions disorders of the skin, particularly in the sedentary.

Lard is the officinal part of the hog, and is the fat of the animal melted. Pure lard has little or no taste and no odor; its melting point is about 97° Fahrenheit. Lard is a compound of a solid firm fat, *stearine*, and a semifluid substance, termed *elaine*, in the proportion of thirty-eight of the former to sixty-two of the latter.

Most fats and oils, whether of animal or vegetable origin, are composed of these two ingredients, upon the relative proportion of which their consistence respectively depends. They may be obtained separate by the action of boiling alcohol, which on cooling deposits the stearine and yields the elaine upon evaporation. Another method is to compress fat, or oil congealed by cold, within the folds of bibulous paper. The elaine is absorbed by the paper, and may be separated by compression under water; the stearine remains. Elaine resembles oil in appearance, is colorless when pure, congeals at 20° Fahrenheit, may be evaporated unchanged *in vacuo*, has little odor and a sweetish taste, is insoluble in water but soluble in boiling alcohol, and consists of carbon, oxygen, and hydrogen.

Stearine is white, concrete, fusible at 111° Fahrenheit, volatilizable, unchanged *in vacuo*, partly volatilized and partly decomposed when heated in a retort, insipid, inodorous, slightly soluble in alcohol, insoluble in water, and composed, like the former principle, of carbon, oxygen, and hydrogen.

Exposed to the air, lard absorbs oxygen, and becomes rancid. It should therefore be kept in well-closed vessels, or procured fresh when wanted for use. In the rancid state it

is irritating to the skin, and sometimes exercises an injurious reaction on substances mixed with it.

In the United States, where swine are raised so abundantly, oil is now very extensively separated from lard. Its close connection with the question of disposing of the agricultural products of the Union, and especially of the Western States, forms a reason for giving it an extended consideration.

Lard-oil is considered much superior to olive or sperm oil, for machinery, and for the manufacture of woollens, &c. It can be furnished also at half the price, and therefore it will doubtless supersede that article of import. As it contains less stearine than other oils, it is found much better for combing wool, for which purpose a single factory wished to contract for ten thousand gallons from one establishment.

Repeated experiments have shown, that for the purpose of combustion no oil is superior. It is important, in trying it with this view, to obtain a good article, manufactured from good lard, and not from the dark-burned which creates smoke and clogs the flame. For want of sufficient care in this respect, some have no doubt met with disappointment in their attempts to substitute this oil for sperm oil in their lamps.

The following are given as the relative constituents of lard oil and sperm oil, in one hundred parts of either: —

	Carbon.	Oxygen.	Hydrogen.
Lard oil, . .	79.03	9.548	11.422
Sperm oil, . .	79.5	8.9	11.6

It will thus be seen that the difference in carbon is only .47, in hydrogen about .18, while in oxygen it is over .60 in favor of the lard-oil. The large quantity of carbon proves that it may be relied on as a material for giving light, as it is well known that, whenever carbon predominates in an animal oil, the article is capable of a high degree of luminous power. Experiments have been made which have shown results in favor of lard-oil. About 60 lbs. in 100 of good lard, in tallow only 28, are oil, and the process of manufacture resorted to shows that it may be made a profitable business. Large orders have already been executed at the West for this oil, to be used in the Eastern States.

The heat of lard oil for the blow-pipe has been found to be much greater than that of sperm. Lard itself melts at 97° Fahrenheit; its specific gravity at 60° is 0.938. Lard crystallizes in small globules, sperm in flakes or scales. It is soluble

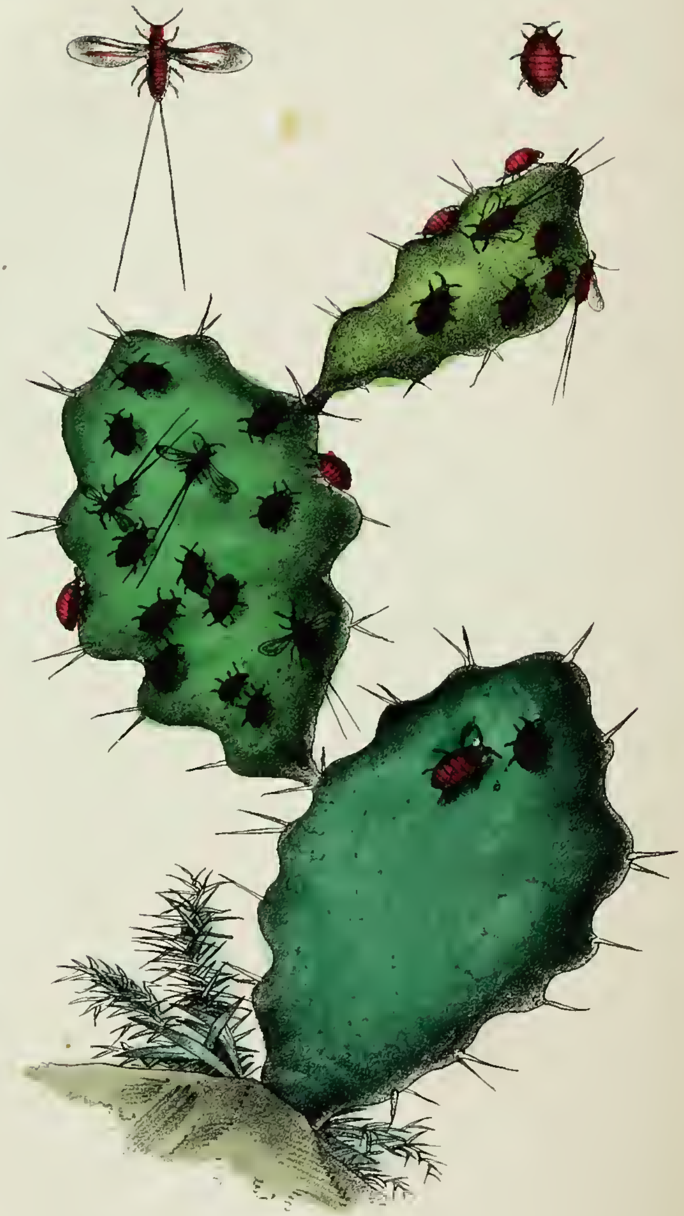
in boiling alcohol. The proportion is eighty gallons of lard to one of alcohol. The application of stearine for making candles promises greatly to reduce the price of that article, so that candles equal to spermaceti may eventually be obtained for twelve and a half cents per pound.

As the capillary attraction of the lard-oil is not so great as that of sperm, it is recommended that the form of the lamp should be such as to bring the bulk of the oil as near to the point of combustion as possible. It is also recommended that the tube should be filed thinner at the top, where the wick is inserted, to prevent the escape of heat. Various lamps have been constructed for burning lard as well as lard-oil, which have been found to answer very well. The burning of this oil has been introduced with entire success into the lighthouses on Lake Erie. An objection has been made against lard-oil, that it is not capable of being preserved in a liquid state in cold weather, but by a process similar to that by which the winter sperm is prepared, lard-oil can be made which will not chill at 30° of Fahrenheit.

The importance of this application of lard can scarcely yet be realized. Vast quantities of the oil can be manufactured at the West. Indeed, there is hardly an assignable limit to the power of production of the article, so that, while the demand continues, the business may be conducted profitably.

The proportion of lard to the whole hog is about sixty per cent., after taking out the hams and shoulders; or taking out the hams only, the estimate for hogs of the best breeds, and so fed as to produce the greatest quantity of fat, is seventy per cent.

By a new process of steaming (a very simple method described by Mr. Stafford) it appears that the whole of the lard or oily matter in the hog, or of tallow in cattle, may be obtained, while the danger of burning (common in other modes) is avoided, the consumption of fuel is lessened, and the degrée of pressure required not so great as otherwise. It will be recollected that, while conducting the manufacture of lard, the other parts of the animal, as the hams and shoulders, may be turned to profit. Besides these, also, the hides may be tanned by a cheap process, and the bones, which are worth half a cent per pound, may be calcined and made into animal carbon, for which they are said to be worth, in this calcined state, two cents and a half per pound. (*Ellsworth's Report.*)



Lith. of E. C. Kellogg. Hartford, Conn.

No. 10.

COCCUS CACTI.

Cochineal Insect.

HOMOGANGLIATA.

Articulated Animals.

No. 10.

COCCUS CACTI.

COCHINEAL INSECT.

The animal substance. *Cochineal.* A medicinal agent.

Geog. Position. Mexico.

Quality. Faint, heavy odor; bitter, austere taste.

Power. Antispasmodic, anodyne.

Use. Whooping-cough, neuralgic affections. In pharmacy, to color tinctures and ointments. In the arts, to dye scarlet and crimson, and in the manufacture of *carmine* and *lake.*

SCIENTIFIC ANALYSIS.

Natural Classification.

4. Division *Homogangliata.* Class *Insecta.*

Ballard and Garrod, Mat. Med. 458. Syst. Nat. Gmelin, I. 222. Elem. Nat. Hist. II. 318. Pereira, Mat. Med. II. 793. Thomson, Mat. Med. *73. Lond. Disp. 287. U. S. Disp. 261. Wyatt, Nat. Hist. 133. Ec. Disp. U. S. 130.

Genus COCCUS.

Cochenille (Fr.), Cochenille (Ger.), Cochenilje (Dutch), Konsienell (Swed.), Cuzzinel (Dan.), Coccinilia (It.), Cochinilla (Sp.), Cochincel poochie (Tam.).

The Essential Characters.

Wings two, covered by two *elytra* generally membranous at their free extremity.

Mouth formed for suction, the *rostrum* composed of a tubular articulated sheath, including four scaly *setæ* in place of mandibles and jaws, organs which have disappeared in these insects.

Elytra in some crustaceous, with the posterior extremity membranous; in others almost similar to wings, but more extended, thicker, and colored.

Eyes never more than two, and many have smooth eyes.

Metamorphosis generally incomplete.

The Secondary Characters.

Coccus. *Tarsi* with one joint only and terminated by a single hook. *Male* destitute of a *rostrum*, with two wings which lie one over the other horizontally. *Abdomen* terminated by two *setæ.* Female apterous, furnished with a *rostrum. Antennæ* filiform or setaceous, and most commonly with eleven joints.

The Specific Characters.

Coccus cacti. *Male* very small, with the antennæ shorter than the body. Body elongated, of a deep red, terminated by two long, diverging *setæ. Wings* large, white, crossed above the abdomen. *Female* nearly twice as large as the male, bluish red, covered with a white *farina. Antennæ* short. *Body* flattened below, convex. *Feet* short.

NATURAL HISTORY.

This insect, Coccus cacti, is found in its wild state in Mexico and the adjoining countries feeding on several species of Cactus and allied genera of plants. It is said also to have been discovered in some of the West India Islands, and the southern parts of the United States. In Mexico, however, and particularly in the provinces of Oaxaca and Guaxaca, it is an important object of culture, where it is, as it were, domesticated and reared with great care. Plantations of the nopal (*Opuntia cochinillefera*) are made, upon which the insect feeds and propagates, and attains to a greater size than in the wild state. The insect has been taken from Mexico to the Canary Islands, where the product is now very large; and considerable quantities of cochineal have been brought to market from the island of Teneriffe. The culture has also been successfully introduced into Java by the Dutch, and attempts have been made to introduce it into Spain, Corsica, and Algiers.

The cochineal insect is small, very seldom exceeding a small pea in magnitude, with the head, except in the males, scarcely distinct from the body, which is depressed, downy, and transversely rugose. The abdomen is of a purplish-red color, flat below and convex above. The legs are six in number, short and black. The males — which are few in propor-

tion to the females, there being, according to Mr. Ellis, only one to one hundred and fifty or two hundred females — are winged, slender, and active, with the body of a red color; the head is small, but very distinct from the neck, furnished with jointed feelers, and two long, diverging white hairs, about five times the length of the body, which proceed from the tail. The body is elliptical, and furnished with beautifully snow-white wings, which lie flat when the insect rests or walks, but are erected when it flies. The females have no wings, and are sluggish, scarcely ever moving from the part of the plant where they fix themselves; here they couple and increase considerably in size. Each insect lays several thousand eggs, which proceed from the body through an aperture placed at the extremity of the abdomen, and pass under the belly to be there hatched. Death then ensues, the body of the mother dries up, its two membranes become flat, and form a sort of shell or cocoon, in which the eggs are inclosed, and from whence the little cochineals soon proceed. The female only is of commercial value.

The wild cochineal is collected six times in the year, just before the females begin to lay their eggs, a few being left on the plants to furnish a future supply. But the domesticated insect is collected thrice only in the same space of time, the domestication diminishing the number of breeds to three in a year, owing to their propagation being suspended during the rainy seasons, whilst the downy covering of the wild species allows them to withstand the inclemency of these seasons. At the third gathering, branches of the plant, to which a certain number of females is left adhering, are broken off and preserved with great care under cover during the rainy season, and after this is over they are distributed over the out-door plantations of the cactus, where they soon multiply, and in the space of two months the first crop is fit to be gathered. The insects are detached from the plant by means of a blunt knife, then put into bags and dipped into boiling water to kill them, after which they are dried in the sun; and although they lose two thirds of their weight in this process, yet about six hundred thousand pounds are carried annually to the European markets.

Cochineal was used by the natives of Mexico before the Spaniards arrived there in 1518, and was introduced into Europe very soon after. The domesticated kind, which is

not only much larger, but yields a richer color, and is consequently most esteemed, is known in the language of the Spanish merchants by the name "*grana fina*." The wild is one half the size only of the other, covered with white down or powder, and is denominated "*grana silvestra*." But both kinds are often mixed together. They are imported in bags, each containing about two hundredweight, and have the appearance of small, dry, shrivelled, rugose berries or seeds, of a deep brown-purple or mulberry color, with a white matter between the wrinkles. In this state they suffer no change from length of keeping. Dr. Bancroft directs that cochineal, to be chosen as the best, should be "large, plump, dry, and of a silver-white color on the surface."

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Cochineal has a faint, heavy odor, and a bitter, austere taste. It is easily pulverized, affording a powder of a purplish-red hue, which has been found to be composed chiefly of carmine, a peculiar animal matter, a fatty matter, phosphate and carbonate of lime, and muriate and phosphate of potassa; the coloring matter is taken up by water, alcohol, and solutions of the pure alkalies. The watery infusion is of a violet crimson, the alcoholic of a deep crimson, and the alkaline of a deep purple or rather violet hue. The color of the watery infusion is brightened by all the acids, except the oxymuriatic (*chlorine*), by which it is destroyed. It is brightened also by supertartrate of potassa and alum, and at the same time is partly precipitated. It is also precipitated by sulphate of iron of a brownish-violet color, the liquid remaining a pale yellowish-brown, and by sulphate of zinc and acetate of lead of a purple-violet, the liquid being perfectly colorless. Hence cochineal is incompatible as a coloring matter with these metallic salts. According to the analysis of Pelletier and Caventon, it contains carmine (*cochinaline*), a fatty matter, phosphate and carbonate of lime, muriate and phosphate of potassa, and potassa united to an animal acid.

Antispasmodic and anodyne properties have been assigned to cochineal. A mixture with carbonate of potash has been at various times extolled as a remedy for whooping-cough. Its only real value, however, is as a coloring matter, and as such it is used both in powder and solution.

Lith of E C Kellogg, Hartford, Conn.

No. 11

CASTOR FIBER

VERTEBRATA.

Vertebrated Animals.

No. 11.

CASTOR FIBER.

THE CASTOR BEAVER.

The animal substance. *Castoreum.* *Castor.* A medicinal agent.

Geog. Position. North America, Europe.
Quality. Bitter, nauseous.
Power. Stimulant, antispasmodic, emmenagogue.
Use. Hysteria, epilepsy, amenorrhœa, chlorosis.

SCIENTIFIC ANALYSIS.

Natural Classification.

5. Division *Vertebrata.* Class *Mammalia.*

Ballard and Garrod, Mat. Med. 446. Syst. Nat. Gmelin, I. 124. Pereira, Mat. Med. II. 825. Thomson, Mat. Med. 512, 1038. Lond. Disp. 247. U. S. Disp. 195. Wyatt, Nat. Hist. 45. Ec. Disp. U. S. 111.

Genus CASTOR.

Castoreum (Fr.), Kastoreunt, das Bibergeil (Ger.), Castoro (It.), Castoreo (Sp.), Bevergeil (Dutch), Bafvergall (Swed.), Stroy Bobrowy (Pol.), Ash batchegan (Ara.), Goond beyduster (Pers.).

The Essential Characters.

Teeth, two large *incisors* in each jaw, increasing during life, and of prismatic form, separated from the molars by a vacant space, the enamel concentrated to the front. *Canines* none. *Molars* with flat crowns or blunt tubercles, whose enamelled eminences are always transverse.

Under jaw articulated by a longitudinal condyle, so as to have no horizontal movement, except from behind forwards, and *vice versâ*, as is suitable for the action of gnawing.

Extremities, the posterior longest, terminated by unguiculated *toes*, the number varying according to the species.

Mammæ variable in number.

Stomach empty, simple, or little divided.

Intestines very large.

The Secondary Characters.

Castor. *Molars* to the number of four, everywhere composed of flat crowns, with sinuous and complicated ridges of enamel. Five *toes* to each foot, the anterior short and close, the posterior longer and palmated. *Tail* broad, thick, flattened horizontally, of an oval form, naked, and covered with scales.

The Specific Characters.

Castor fiber. *Incisor teeth* smooth, orange-colored anteriorly, white posteriorly. *Fur* consisting of two sorts of hair, one coarse and brownish, the other downy, more or less gray. About two feet long. *Tail* remarkable for its scaly appearance. Its great breadth (often five inches) depends not on the width of the caudal vertebræ, but on numerous strong tendons inserted on these vertebræ.

There is some reason for supposing that the American and European beavers are distinct species. The former are for the most part *builders*, the latter are *burrowers*.

NATURAL HISTORY.

The Beaver is an amphibious quadruped found in the northern parts of Europe and America, living on the wooded banks of uninhabited rivers and lakes, in which situations it is gregarious, and constructs its habitation with more apparent skill than any other animal except man. The body is thick, not three feet in length, and covered with short iron-brown and chestnut-colored hair; the feet are webbed, the eyes small, round, and so acutely sensible of light as to remain open only in dull weather, and the ears short, hairy, and so formed that the meatus is closely shut when the animal plunges and is beneath the water. The tail is gray, and about half the length of the body, flat, horizontal, scaly, with that part of it only which is next to the body covered with hairs. Between the anus and the external genitals are four follicles, of an oblong shape, smaller above and larger below; the two smaller are filled with a fatty substance, while the two larger contain each about two ounces of an oily, viscid, strong-smelling substance inclosed in membranous cells, which is the officinal *castor*.

The general aspect of the beaver, at first view, is that of a very large rat, and seen at a little distance it might be readily

mistaken for the common muskrat. But the greater size of the beaver, the thickness and breadth of its head, and its horizontally flattened, broad, and scaly tail, render it impossible to mistake it for any other creature when closely examined. In its movements, both on shore and in the water, it also closely resembles the muskrat, having the same quick step, and swimming with great vigor and celerity, either on the surface or in the depths of the water.

In a state of captivity or insulation, the beaver is a quiet or rather stupid animal, evincing about as much intelligence as a tamed badger, or any other quadruped which can learn to distinguish its feeder, come when called, or grow familiar with the inmates of the house where it is kept. It is only in a state of nature that the beaver displays any of those singular modes of action, which have so long rendered the species celebrated. These may be summed up in a statement of the manner in which they secure a sufficient depth of water to prevent it from being frozen to the bottom, and their mode of constructing the huts in which they pass the winter.

The materials used for the construction of their dams are the small trunks and branches of the birch, mulberry, willow, poplar, &c. They begin to cut down their timber for building early in the summer, but their edifices are not commenced till about the middle or end of August, and are not completed until the beginning of the cold season. The strength of their teeth and their perseverance in this work may be fairly estimated by the size of the trees they cut down. These are cut in such a manner as to fall into the water, and then floated towards the site of the dam or dwellings. Small shrubs, &c., cut at a distance from the water, they drag with their teeth to the stream, and then launch and tow them to the place of deposit. At a short distance above a beaver-dam, the number of trees which have been cut down appears truly surprising, and the regularity of the stumps which are left might lead persons unacquainted with the habits of the animal to believe that the clearing was the result of human industry.

The figure of the dam varies according to circumstances. Should the current be very gentle, the dam is carried nearly straight across; but when the stream is swiftly flowing, it is uniformly made with a considerable curve, having the convex part opposed to the current. Along with the trunks and

branches of trees they intermingle mud and stones to give greater security, and when dams have been long undisturbed and frequently repaired, they acquire great solidity, and their power of resisting the pressure of water and ice is greatly increased by the willow, birch, &c. occasionally taking root, and eventually growing up into something of a regular hedge. The materials used in constructing the dams are secured solely by the resting of the branches, &c. against the bottom, and the subsequent accumulation of mud and stones by the force of the stream or by the industry of the beavers. In various parts of the Western country, where beavers are at present entirely unknown, except by tradition, the dams constructed by their labors are still standing securely, and in some instances serve instead of bridges to the streams they obstruct. There are few States in the Union in which some remembrance of this animal is not preserved by such names as *Beaver-dam*, *Beaver-lake*, *Beaver-falls*, &c.

The dwellings of the beaver are formed of the same materials as their dams, and are very rude, though strong, and adapted in size to the number of their inhabitants. When building their habitations, they place most of the wood crosswise, and nearly horizontally, observing no other order than that of leaving a cavity in the middle. Branches which project inward are cut off with their teeth and thrown among the rest. The places are by no means built of sticks first, and then plastered, but all the materials, sticks, mud, and stones, if the latter can be procured, are mixed up together, and this composition is employed from the foundation to the summit. The mud is obtained from the adjacent banks or bottom of the stream or pond near the door of the hut. Mud and stones the beaver always carries by holding them between his fore paws and throat. Their work is all performed at night, and with much expedition. When straw or grass is mingled with the mud used by them in building, it is an accidental circumstance, owing to the nature of the spot whence the latter was taken. As soon as any part of the material is placed where it is intended to remain, they turn round and give it a smart blow with the tail. The habit of flapping with the tail is retained by them in a state of captivity, and, unless it be in the acts already mentioned, appears designed to effect no particular purpose. Their dwellings which have stood for some time, and been kept in repair,

become so firm, from the consolidation of all the materials, as to require great exertion and the use of the ice-chisel or other iron instruments to be broken open. The laborious nature of such an undertaking may easily be conceived, when it is known that the tops of these habitations are generally from four to six feet thick at the apex of the cone. The Northern Indians believe that the beavers always thicken the northern walls of their dwellings much more than the others, in order more effectually to resist the cold. Consequently, these Indians always break into the huts from the south side.

In situations where the beaver is frequently disturbed and pursued, all its singular habits are relinquished, and its mode of living changed to suit the nature of circumstances; and this occurs even in different parts of the same rivers. Instead of building dams and houses, its only residence is then in the banks of the stream, where it is now forced to make a more extensive excavation, and be content to adopt the manners of a muskrat. More sagacity is displayed by the beaver in thus accommodating itself to circumstances, than in any other action it performs. Such is the caution which it exercises to guard against detection, that were it not for the removal of small trees, the stumps of which indicate the sort of animal by which they have been cut down, the presence of the beaver would not be suspected in the vicinity. All excursions for the sake of procuring food are made late at night, and if it pass from one hole to another during the day-time, it swims so far under water as not to excite the least suspicion of the presence of such a voyager. On many parts of the Mississippi and Missouri, where the beaver formerly built their dwellings, no such works are at present to be found, although beavers are still to be trapped in those localities. The same circumstances have been remarked of the European beaver, which has been thought to belong to another species, because it does not build.

The beaver swims to considerable distance under water, but cannot remain for a long time without coming to the surface for air. They are therefore caught with greater ease, as they must either take refuge in the banks, or seek their huts again for the sake of getting breath. When disturbed, they usually fly from their huts to these banks, which, although not so exposed to observation as their dwellings, are yet discovered with sufficient ease, and allow the occupant to be

more readily captured than if he had remained in his ordinary home. To capture beavers residing on a small river or creek, the Indians find it necessary to stake the stream across to prevent the animals from escaping, and then they try to ascertain where their hiding-places in the banks are situated. This can only be done by those who are very experienced in such explorations. The hunter takes with him an ice-chisel lashed to a handle four or five feet in length; with this instrument he strikes against the ice as he goes along the edge of the banks. The sound produced by the blow informs him when he is near the beaver's lair. A hole is then cut through the ice of sufficient size to admit a full-grown beaver, and the search is continued until as many of the places of retreat are discovered as possible. During the time the most expert hunters are thus occupied, others are busy in breaking into the beaver-huts, — a task of some difficulty. The beavers, alarmed at the invasion of their dwelling, take to the water and swim with surprising swiftness to their retreats in the banks, but their entrance is betrayed to the hunters watching the holes in the ice by the motion and discoloration of the water. The entrance is instantly closed with stakes of wood, and the beaver, instead of finding shelter in his cave, is made prisoner and destroyed. The hunter then pulls the animal out, if within reach, by the introduction of his hand and arm, or by a hook designed for this use, fastened to a long handle. Beaver dwellings found in lakes or other standing waters offer an easier prey to the hunters, as there is no occasion for staking the water across.

The beaver feeds principally upon the bark of the aspen, willow, birch, poplar, and occasionally the elder, but it rarely resorts to the pine tribe, unless from severe necessity. They provide a stock of wood from the trees mentioned, during the summer season, and place it in the water opposite the entrance to their huts. They also depend in a great degree upon the large roots of the *Nuphar luteum*, *common yellow nuphar*, but it is remarked that these roots, although they fatten the beaver, impart a rank and disagreeable taste to its flesh. During the winter season the beaver becomes very fat, and its flesh is esteemed by the hunters to be excellent food. But those occasionally caught in the summer are very thin and unfit for the table. They lead so wandering a life at this season, and are so much exhausted by the collection

of materials for building, or the winter's stock of provision, as well as by suckling their young, as to be generally at that time in a very poor condition. Their fur during the summer is of but little value, and it is only in winter that it is to be obtained in that state which renders it so desirable to the fur-traders. The different appearance of the fur, caused by age, season, disease, or accident, has at times led some to suppose the existence of several species of beaver in this country. No other species, however, has yet been discovered than that under consideration.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Castor has a strong, peculiar, somewhat aromatic odor, and a bitter, sub-acrid taste. The odorous principle is dissipated in forming the decoction, which displays an alkaline reaction. Both alcohol and ether take up all the active principles of castor, and retain its odor and taste. According to Bonn, castor contains an ethereal oil, cholesterine, resin, lime, iron, and some salts. Bouillon, Lagrange, and Laugier found a volatile oil, benzoic acid, resin, adipocere, a coloring principle, mucus, carbonate of potassa, lime, ammonia, and iron. M. Bizio obtained from it a peculiar crystalline matter, which he called *Castorin*, having the odor of the castor and a styptic taste. From the American castor scarcely any is procured.

The castor is contained in follicles found in both sexes. They are placed near the pubis under the skin. There are two castor follicles, each covered with a cellular coat inclosing muscular fibres, intended to compress the follicle. During life the castor is semifluid, but gradually becomes solid and viscid, occasionally perfectly dry and pulverulent. The quantity contained in the sacs is very variable. The best castor is that which comes from Russia, but it has been very rare of late years, and almost all now found in the market is imported from Canada. The former is in roundish, solid, pod-like sacs, smooth on the outside, and when cut presenting an orange-colored surface; the latter is in oblong, thin sacs, corrugated on the outside, and deeper-colored than Russian castor. The Russian, when treated with ammonia, affords a whitish, the American an orange-colored product.

When the beaver is taken, the follicles are cut off entire and dried, either by exposure to the sun or in smoke. They

are in pairs, like two testicles united at the upper end. The cods of the Russian castor are large, dry, roundish, heavy, and solid, appearing when cut of a reddish liver color; those of the American are smaller, hard, oblong, thin, and corrugated on the outside. In each beaver there is a large and small bag, and the castor in the larger bag is always the best. The goodness of the castor is determined by its sensible qualities; that which is quite black is insipid, inodorous, oily, and unfit for use. Castor is said to be sometimes counterfeited by a mixture of some gummy and resinous substance with a little real or genuine castor, artificially interspersed with membranes and stuffed into the scrotum of the goat. The fraud is easily detected by comparing the smell and taste with those of real castor, and by the deficiency of the sebaceous follicles, which are always attached to the real cods.

Castor is antispasmodic and emmenagogue. It was formerly given in combination with myrrh as a specific in quartans; and is still prescribed with seeming advantage in low nervous fevers, hysteria, epilepsy, and spasmodic affections; and from the idea of its action being particularly determined to the uterine system, it is supposed to prove useful in amenorrhœa and chlorosis. It may be exhibited either in powder or in the form of tincture, but owing to the scarcity and the high price of good castor it is seldom ordered; and moreover, the *materia medica* certainly contains many antispasmodics equally good, and perhaps better.

Castor is supposed to operate chiefly on the cerebro-spinal nerves. In moderate doses it causes a sensation of heat in the stomach and accelerates the pulse, it enters the circulation and displays the presence of its odorous principle in the urine. Its influence as an antispasmodic was at one time conceived to be considerable, but recent experience has not confirmed this opinion. The dose of castor is from ten grains to one scruple, but it may be given to almost any extent. It is administered also in the form of a tincture.

Castor has been regarded above as a beneficial emmenagogue, when the suppression of the catamenia is connected with spasm and hysteria. It is not, however, an emmenagogue of much value. Dr. Alexander affirms, that it produces very little sensible effect upon the habit, in much larger doses than those in which it is usually given, and he consequently condemns it as a useless and inert substance.

Lith. of E. C. Kellogg, Hartford, Conn.

N° 12.

VIVERRA CIVETTA.

The Civet Cat.

VERTEBRATA.

Vertebrated Animals.

No. 12.

VIVERRA CIVETTA.

THE CIVET CAT.

The animal substance. *Zibethum.* *Civet.* A medicinal agent.

Geog. Position. Asia, Africa.
Quality. Soft, odoriferous.
Power. Stimulant, nervine, antispasmodic.
Use. Principally as a perfume.

SCIENTIFIC ANALYSIS.

Natural Classification.

5. Division *Vertebrata.* Class *Mammalia.*

Wyatt, Nat. Hist. 39. Desmarett, Mammalogy, 205. U. S. Disp. 1315. Jones, An King. 654.

Genus VIVERRA.

Civette (Fr.), der Zibet (Ger.), Algalia (Sp.).

The Essential Characters.

Teeth, four thick and long canine. Six *incisors* in each jaw, the root of the second of the lower ones being placed a little more inwards than the others. The *molars* are entirely trenchant, or have blunted tuberculous parts, but never bristled with conical points. The anterior molars are the most trenchant; they are called *false molars*; next comes a molar larger than the others, and which has generally a tuberculous heel, more or less wide; it is called *carnivorous;* then follow one or two small teeth perfectly flat, and denominated *tuberculous.*

Carnivorous, more or less so in proportion to the quantity of the tuberculous surfaces, the acuteness of the false molars, and the length of the canine.

Best adapted for biting, they which have the fewest false molars and shortest jaws.

Courage not proportioned to their size and strength.

The Secondary Characters.

Viverra. Three false molars above, four below, the anterior of which sometimes fall out. Two pretty large tuberculous teeth above, only one below. *Tongue* bristled with sharp and rough papillæ. *Claws* more or less retractile. They often emit an agreeable perfume.

The Specific Characters.

Viverra civetta. A deep *pouch* divided into two sacs, filled with a pomade of a strong musky smell. *Pupil* of the eye round during the day. Claws semi-retractile.

NATURAL HISTORY.

Viverra civetta, a genus of carnivorous, mammiferous quadrupeds, natives of the torrid regions of the ancient continent, particularly distinguished by having a secretory apparatus which forms a powerful odorous matter, known by the name of *Civet*. These animals have been called *Musk Cats*, or *Civet Cats*, yet they are not of the cat species, which, however, they resemble in some zoölogical points, and in their activity and their predatory, sanguinary, and nocturnal habits. They somewhat resemble the fox, especially in the head, and also in its habits; but the tail is long, hairy, and cylindrical, and the claws, though by no means so acute as those of the cat, are still partially retractile, or cat-like. The resemblance of the *Viverra* to the feline race is increased by the pupil of the eyes, which contracts in a straight line, and by the color of the skin, which is diversified with stripes and spots, a circumstance which has occasioned them to be mistaken for small panthers, by persons who had only seen them at a distance. In every other respect, however, they differ from the panther.

The civet is from two to three feet in length, stands from ten to twelve inches high, and has a tail half the length of its body. The hair is long, and the ground color of it is a brownish gray, interspersed with numerous transverse, interrupted bands or irregular spots of black. Along the centre of the back, from between the shoulders to the end of the tail, is a kind of mane, which can be erected or depressed as the animal pleases, and which is formed of black hairs longer than those of the body. The sides of the neck and the upper lip are nearly white. The tongue is studded with stout horny

prickles, and the ears are of middling size, straight, and rounded at their tips. The legs and the greater part of the tail are perfectly black. There is a large black patch round each eye, which passes thence to the corner of the mouth, and two or three bands of the same color stretch obliquely from the base of the ears towards the shoulder and neck, the latter of which is marked with a black patch. The animal is wild and fierce, and though sometimes tamed, is yet never thoroughly familiar. Its teeth are strong and sharp, but its claws are feeble and blunt. It is light and active, and lives by prey, pursuing birds and other small animals which it is able to overcome. It generally attacks at night, and by surprise. They are sometimes seen stealing into yards and outhouses, like the fox, in order to carry off poultry. Their eyes shine in the night, and it is very probable that they see better by night than by day. When they fail of animal food, they are found to subsist upon roots and fruits. They very seldom drink, nor do they ever inhabit humid ground, but in burning sands and in arid mountains they cheerfully remain.

The civets, though natives of the hottest climates of Asia and of Africa, are yet capable of living in temperate, and even in cold countries, provided they are carefully defended from the injuries of the air, and provided with delicate and esculent food. Persons who breed these animals for the sake of their perfume, put them into a long and narrow sort of box, in which they cannot turn. This box the person who is employed to collect the perfume opens behind for this purpose, twice or thrice a week, and, dragging the animal which is confined in it backward by the tail, he keeps it in this position by a bar before. This done, he takes out the civet with a small spoon, carefully scraping with it all the while, as gently as possible, the interior coats of the pouch. The perfume thus obtained is put into a vessel, and every care is taken to keep it closely shut. The quantity which a single animal will afford depends greatly upon its appetite and the quality of its nourishment. It yields more in proportion as it is more delicately and abundantly fed. Raw flesh hashed small, eggs, rice, small animals, birds, young fowls, and particularly fish, are the food in which the civet most delights. In Holland, where no small emolument is derived from their perfume, they are frequently reared. The perfume of Amsterdam is esteemed preferable to that which is brought from the Levant,

or the Indies, which is generally less genuine. That which is imported from Guinea would be the best of any, were it not that the negroes, as well as the Indians and the people of the Levant, adulterate it with mixtures of laudanum, styrax, and other balsamic and odorous drugs.

The generality of naturalists have been of opinion that there is only one species of animals that furnish the perfume known by the name of civet. Two animals that furnish it, however, are easily distinguishable; namely, the Viverra civetta, or *civet cat* of Africa, and the Viverra zibetha, which inhabits the East Indies. The latter animal differs from the civet in having a body longer and less thick, a snout flatter, more slender, and somewhat concave at the upper part; its hair is much shorter and softer, it has no mane, and no black under the eyes or upon the cheeks.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Civet is an odorous substance, and a very strong perfume. It is secreted in the opening between the anus and external genitals, and though the odor is so strong, it is yet agreeable even when it issues from the body of the animal. This perfume must not be confounded with that of musk, which is a sanguineous humor obtained from an animal altogether different from the civet.

Civet zibethum is a semi-liquid, unctuous, yellowish, becoming brown and thicker by exposure to the air, of a very strong, peculiar odor, similar to that of musk, though less agreeable and less diffusible, and of a bitterish, sub-acrid, disagreeable, fatty taste. When heated it becomes quite fluid; and at a higher temperature takes fire and burns with a clear flame, leaving little residue. It is insoluble in water, and only slightly soluble in ether and cold alcohol; but heated alcohol dissolves it almost entirely, depositing it again upon cooling. It contains, among other ingredients, a volatile oil, fat, and free ammonia. In medicine it was formerly employed as a stimulant and antispasmodic, like castor and musk, and its virtues were considered both numerous and various; but it is now almost entirely laid aside, even as a perfume, so that the words of the dramatist, — "Give me an ounce of civet, good apothecary, to sweeten my imagination," — may be frequently repeated, even in our largest cities, with slight probability of obtaining the article.

Lith. of E. C. Kellogg, Hartford. Conn.

Nº 13
OVIS ARIES.
The Sheep.

VERTEBRATA.

Vertebrated Animals.

No. 13.

OVIS ARIES.

THE SHEEP.

The animal substance.	*Sevum.* *Suet.*	A medicinal agent.

Geog. Position. Domesticated everywhere.
Quality. White, inodorous.
Power. Demulcent, emollient.
Use. Diarrhœa, dysentery, to give consistence to ointments and plasters.

SCIENTIFIC ANALYSIS.

Natural Classification.

5. Division *Vertebrata.* Class *Mammalia.*

Ballard and Garrod, Mat. Med. 448. Syst. Nat. Gmelin, I. 197. Jones, An. King. 647. Pereira, Mat. Med. II. 819. Lond. Disp. 467. U. S. Disp. 681. Wyatt, Nat. Hist. 54. Ec. Disp. U. S. 376.

Genus OVIS.

Graisse de Mouton (Fr.), Hammeltalg (Ger.), Grasse duro (It.), Grassa (Sp.) Aatoo Kalupoo (Tam.), Lemak (Malay), Ellǫomustail (Cyng.), Addjavuppa (Sans.).

The Essential Characters.

Incisors none in the upper jaw, in the lower usually eight. A vacant space between the incisors and molars, but in which in some genera are found one or two canines. *Molars* twelve in each jaw, the crown marked with two double crescents of enamel, of which the convexity is universally outwards in the lower jaw, and inwards in the upper.

Clavicles none. Extremities disposed for walking. Two toes furnished with hoofs, metacarpal and metatarsal bones united.

Stomachs four, the first and largest is called the *paunch*, the

second the *bonnet*, the third the *leaflet*, and the fourth the *rennet*. *Intestines* long.
Mammæ two or four, inguinal.
Horns in the male and frequently in the female of most species.

THE SECONDARY CHARACTERS.

OVIS. *Horns* common to both sexes, sometimes wanting in the female, thick, angular, wrinkled transversely, pale-colored, directed backwards, but inclining spirally more or less forward. *Forehead* generally convex. *Ears* small. *Beard* none. *Legs* slender. *Hair* of two kinds. *Tail* more or less short. *Mammæ* two.

THE SPECIFIC CHARACTERS.

OVIS MUSIMON. *Horns* very strong, arched backward, and curved downwards, and towards the point. General *color* fawn, more or less brown, white on the face and legs, and under the belly; a darker streak on the dorsal line, on the flanks, and often black about the neck.

☞ The immense number of races of this animal in cultivation is well known, and it is now difficult, perhaps impossible, to determine its native condition. Modern zoölogists, however, ascribe the domesticated sheep to the *Ovis musimon*, termed the *Mouflon* or *Muflon* of Sardinia, or to *Ovis ammon*, called the *Argali* of Siberia.

NATURAL HISTORY.

Of domestic animals, SHEEP are, with the exception perhaps of horses and cattle, by far the most important. They can be reared in situations and upon soils where other animals would not live. They afford a large supply of food, and one of the principal materials of clothing. Wool has long been a commodity of immense importance, and its manufacture employs a very considerable number of people. The skin dressed forms different parts of our apparel, and is used for covers of books. The entrails properly prepared and twisted serve for strings for various musical instruments. The bones calcined (like other bones in general) form materials for tests for the refiner. The milk is thicker than that of cows, and consequently yields a greater quantity of butter and cheese, and in some places is so rich that it will not pro-

duce the cheese without a mixture of water to make it part from the whey. The dung is a remarkably rich manure, insomuch that the folding of sheep is become too useful a branch of husbandry for the farmer to neglect. Whether, therefore, the advantages that result from this animal to individuals in particular, or to the world in general, be considered, sheep may certainly be ranked as the first of domestic quadrupeds; and particularly are they deserving the attention of the agriculturist, both from the influence of improvements on the breed, and from their generally affording larger profits than can be obtained from the rearing and feeding of cattle.

The history of the sheep may be traced to the remotest antiquity, for we read that "Abel was a keeper of sheep," *Gen.* iv. 2, and that "Abel brought as an offering to the Lord the firstlings of his flock, and the fat thereof." There probably is not a species amongst all our domesticated animals which in its historical relations is so interesting as the sheep. Its early domestication, its employment as the subject of the first sacrifices, its typical character as an offering of atonement, its importance as forming the principal wealth of the early patriarchs, its various connection, in short, with the political, the religious, and the domestic customs of those primitive magnates of the Jewish nation, are all of them subjects forming ample food for deep and delightful reflection. The relation which existed between the patriarchal shepherds and their flocks was indeed of so intimate and even affectionate a nature, as to have afforded the subject of many of the most beautiful and touching parables and moral illustrations in the Sacred Writings. It is scarcely necessary to refer to the unequalled appeal of Nathan to David, to the still higher and prophetic allusion to the character of the Messiah, or to the sublime illustration of the beneficence of the "great Shepherd of Israel" in the beautiful and well-known pastoral psalm. These are subjects which cannot be discussed here, but it is impossible to pass them wholly without notice. But the historical interest attached to this animal does not stop here. The customs observed in the treatment of their flocks by the shepherds of the Eastern nations, in the present day, offer numerous and highly important coincidences with those incidentally alluded to, or more distinctly described, in the Scriptures.

Many persons are accustomed to consider the sheep as the

most stupid of all domestic quadrupeds, and as the only one which is probably incapable of returning to a state of nature; that it neither knows how to avoid danger, nor to seek shelter from the changes of the atmosphere, nor even to procure nourishment, except in abundant pasturage. To a certain extent this may be true, but those who have witnessed the boldness and agility with which sheep leap from crag to crag, — or the safety with which others descend rocky precipices, to graze on the sweet but scanty herbage below, and then reascend till they reach the summit, bounding upwards with a sureness of foot and strength of spring that seem to rival the goat, — would be disposed to consider that neither their instincts were so obtuse, nor their return to a state of nature under favorable circumstances by any means so difficult, as they had imagined.

The natural habits of the sheep attach it to the highest ground, — to the upland slopes where aromatic plants abound. Nature never intended this animal to occupy the deep alluvial lands of the rich arable farms, or to consume the succulent grasses of the water-meadows. Every farmer is aware that their natural instinct, after being for ages domesticated, still leads them invariably to the elevated portions of the field in which they are placed. All these facts tell the farmer, in very intelligible language, that it is change of food, of pasturage, and, if possible, the giving them occasionally aromatic food, that will best conduce to the prosperity of his flock. Sheep in temperate climates are clothed with wool, which is annually renewed; but in warmer countries the animal is furnished with hair. In its wild state, it has generally horns, but these have nearly disappeared in most of the breeds of domestic sheep. That the primitive breed of sheep were horned we have direct evidence, *Gen.* xxii. 13, *Josh.* vi. 6. Immense flocks of this animal have in all ages of the world been kept by man, but more universally for their wool and skins than for their flesh, for that is yet to many nations by no means a favorite meal. The Calmucs and Cossacks still prefer that of the horse and the camel; the Spaniards who can procure other flesh rarely eat that of the *Merino*. Englishmen perhaps consume more mutton than the people of any other country; but the taste for this is certainly of modern origin. It has rapidly extended, as better breeds and sweeter kinds of mutton have been produced.

The principal varieties of sheep are the large Lincolnshire, the Dorset breed, the Southdown, the Cheviot, and the Merino.

The Lincolnshire sheep are of a large size, big-boned, and afford a great quantity of wool, owing to the rich marshes on which they feed; but their flesh is coarser, leaner, and less finely flavored than that of the smaller breeds.

The Dorset sheep are mostly white-faced, their horns are finely curved, their fleece clear and white, but many of them are without wool upon their bellies; their legs are long and small, and their general form handsome and well proportioned. This breed is prolific, and is principally esteemed for producing lambs at an earlier period than other varieties. Great numbers of these premature victims to luxury are yearly sent to market. The manner of rearing these lambs is curious; they are imprisoned in little dark cabins, the ewes are fed on oil-cakes, hay, corn, turnips, or cabbages, which are given them in a field contiguous to the apartments where the lambs are kept, and at proper intervals the nurses are brought to give suck to their young ones, while the attendants at the same time make their lodgings perfectly clean, and litter them with fresh straw. Great attention is paid to this, as much of the success of rearing these unseasonable productions depends upon warmth and cleanliness.

The Southdown sheep have dun or black faces, and are of the same hardy nature as the Cheviot breed, being able to live and thrive on the barest hills. Their wool is fine, and their mutton well flavored. They have of late years, in consequence of these valuable qualities, proved more advantageous than some of the existing breeds.

The Cheviot breed have no horns, and are mostly white-faced and white-legged; the body is long, with fine, clean, small-boned legs. The mutton is highly esteemed for its flavor. They are valuable as mountain sheep, on account of their hardiness and the superior value of their wool.

The Merino sheep are a celebrated breed. Their excellence consists in the fineness and felting quality of their wool, and the weight yielded by each sheep, the ease with which they adapt themselves to the climate, the readiness with which they take to the coarsest food, their gentleness and tractableness. Their defects are unprofitable and unthrifty form, voracity of appetite, a tendency to barrenness, neglect of their young, and inferior flavor of the mutton.

In Spain the Merino breed are divided into *estantes*, stationary, and *trashumantes*, migratory. The first are those which remain during the year in one place or farm; the last travel some hundred miles every year in search of pasture.

The stationary sheep consist partly of the larger sheep of the lower country, partly of mixed races, and partly of pure Merinos, which do not differ in any respect from the migratory sheep of that name, except in the method of treatment. The stationary Merinos are reared where the district or farm affords them sufficient food during the whole season. They are most numerous in the central countries, where the pastures are less apt to be scorched by the heats of the summer, as in Segovia and the mountain ranges to the north of Madrid.

The migratory sheep have been reckoned to amount to ten millions, which is probably equal to half the whole number of the sheep of Spain. They may be divided into two great bodies, those which are to pass farther to the eastward, to Soria, or even beyond the Ebro. These vast hordes of sheep break up from their winter cantonments south of the Guadiana about the middle of April, and proceed chiefly northward. In the course of their journey northward, they are shorn, in large buildings erected for that purpose. The western or Leonese division crosses the Tagus at Almaraz. The eastern or Sorian division crosses the same river farther to the eastward, at Talavera, and in its course approaches the city of Madrid. Having reached their destination, they are pastured until the end of September, when they recommence their journey southward. Each of these journeys of many miles in length occupies about six weeks in travelling. The older sheep, it is said, when April arrives, know the time of setting off, and are impatient to be gone. In the ten or twelve latter days, increased vigilance is required on the part of the shepherds, lest the sheep should break out. Some of them do so, and pursue their accustomed route, often reaching their former year's pasture, where they are found when the main body arrives; but for the most part these stragglers are carried off by wolves, which abound along the course which the migratory flocks pursue.

These migratory sheep are divided into flocks of a thousand or more, each under the charge of its own mayoral or chief shepherd, who has a sufficient number of assistants under his command. It is his province to direct all the de-

tails of the journey. He goes in advance of the flock; the others follow with their dogs, to collect the stragglers and keep off the wolves which prowl in the distance, migrating with the flock. A few mules or asses accompany the cavalcade, carrying the simple necessaries of the shepherds and the materials for forming the nightly folds. In these folds the sheep are penned throughout the night, surrounded by the faithful dogs, which give notice of the approach of danger.

When the sheep arrive at the shearing-houses, which is in the early part of their journey northward, a sufficient number of shearers are in attendance to shear a thousand or more in one day. The shearing-houses consist of two large, rude rooms, and a low, narrow hut adjoining, termed the sweating-house. The sheep are driven into one of the large rooms, and such of them as are to be shorn on the following day are forced into the long, narrow hut as close as it can be packed, where they are kept all night. They undergo in this state a great perspiration, the effect of which is to soften the hardened, unctuous matter which has collected on the fleece. They are then shorn without a previous washing, and the wool is left in the shearing-houses, where it is sorted and made ready for sale. By this arrangement one thousand sheep or more are shorn with only the delay of a day.

The shepherds employed in tending these sheep amount to more than fifty thousand, which, supposing there are over ten million sheep, is at the rate of about two hundred to each shepherd. The number of dogs is calculated at thirty thousand. These shepherds form a peculiar class of men, strongly attached to their pursuit, and living in a state of great simplicity. Their food is chiefly black bread, oil, and garlic. They eat the mutton of their sheep when they die or meet with accidents. In travelling, they sleep on the ground, wrapping themselves in their cloaks, and in winter they construct rude huts to afford shelter. It is said they seldom marry or change their calling.

The whole of this extraordinary system is regulated by a set of laws, and an especial tribunal exists for the protection of the privileges of the parties having the right of way and pasturage. These parties claim the right of pasturage on all the open and common land that lies in their way, a path of ninety paces wide through the inclosed and cultivated coun-

try, and various rights and immunities connected with the pasturage of the flocks. The system is opposed to the true interests of Spain. A change of pasture may be required for the flocks in the drier countries at certain seasons, but the periodical migration of so vast a body of sheep cannot be necessary to the extent to which it takes place. Enormous abuses are committed on the cultivated country as they pass along. A fourth part of the year consumed in travelling must be prejudicial to the health of the animals in a greater degree than the benefits they derive from a change of pasturage. A prodigious mortality accordingly takes place among these sheep, and more than half the lambs are voluntarily killed, in order that the others may be brought to maturity. The sale of the lamb-skins, which form a subject of export to other countries, is indeed a source of profit, but nothing equal to what the rearing of the animals to their state of maturity would produce. That these extensive migrations are necessary to preserve the fineness of the wool is thought to be an error. Attention to breeding and rearing would more certainly produce this effect than a violent change of place. In Spain itself there are numerous flocks of stationary Merinos, whose wool is of all the fineness required, and in other countries, where the sheep are never moved off the farms that produce them, wool is produced superior to that of the migratory flocks of Spain. The system, however, is of great antiquity, and is so riveted in the habits of this ignorant and intractable people, that it is likely to be one of the last of those ancient abuses which will yield to the desire of change which at this moment agitates the feelings of men in this distracted country. The Spaniards long preserved the monopoly of this race of sheep with jealous care, but other countries at length were able to carry off the Golden Fleece of Spain, and the Merino race is now spread over the greater part of Europe and America.

All the best varieties of sheep have been introduced into the United States, where the raising of sheep, both for the profits of carcass and wool, is a highly productive branch of agriculture. Immense numbers are raised in the high and cool districts in Northern Pennsylvania, New York, and the Eastern States, and various American agricultural periodicals contain valuable observations in regard to sheep in the United States.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Sevum, *Mutton suet*, which is the officinal part of the animal, is chiefly obtained from about the kidneys and loins. It is the most consistent of the real animal fats. It is very white, has some degree of brittleness, is inodorous, of a bland taste, insoluble in water, and nearly so in alcohol. It requires a temperature of 127° Fahrenheit to melt it. Boiling alcohol dissolves it and deposits it again on cooling. It consists, according to Chevreul, of stearine, olein, and a small proportion of hirein. For an account of the two first-mentioned principles, see Sus scrofa, No. 9. Hirein is a liquid like olein, from which it differs, however, in being much more soluble in alcohol, and in yielding hircic acid by saponification.

Like the other fats, suet is demulcent and emollient. It is sometimes boiled in milk in the proportion of three ounces of the suet to one pint of milk, and a cupful of the mixture may be administered in chronic diarrhœa, when there is much acrimony of the contents of the bowels. Its principal use, however, is to give a proper consistence to ointments, cerates, and plasters, and sometimes as a dressing to blisters.

Suet acquires by time an unpleasant smell, and becomes unfit for pharmaceutic purposes.

Sevum præparatum, *Lond. Prepared suet.* Cut the suet in pieces, then melt it by a gentle heat and press it through linen.

Adeps ovillus præparatus, *Dub. Prepared suet.* Cut the suet into small pieces, then melt it by a moderate heat, and strain it by pressing it through a linen cloth.

The above processes are intended to purify them, but in order to obtain them very pure, it is necessary that they be washed in water until the water comes off colorless before they be melted. Any water that may remain attached to the fat is evaporated during the melting, and that it is all evaporated is known by throwing a little of the melted fat into the fire, when it will crackle if any water be present. The heat must not be raised above 97° Fahrenheit, the melting-point of fat, as otherwise the fat is decomposed, rendered acrid, and assumes a yellow color. This purification is seldom attempted by the apothecary, as both kinds of fat can be procured very well purified from the dealers. To keep fat clean and

preserve it from the action of the air, it is generally run into bladders while in the liquid state.

Mutton is less dense than beef, very digestible and wholesome, and is at its greatest perfection when about five years old. It is very much improved by the castration of the animal, and is then called *wether-mutton.* The broth made of it does not agree so well as light beef-tea or veal-tea with delicate and weakened stomachs, but it forms an excellent emollient enema, in cases of ulceration or abrasion of the rectum, and that state of the bowels of infants which occasions green stools and aphthæ.

The milk of the ewe is seldom used either as aliment or medicine. It contains more cream and less whey than cow's milk, but the butter yielded by it never acquires a proper consistence. It is made into cheese in some parts of Scotland, which is bitterish, and when old, warm, biting, and resembling Parmesan cheese in flavor.

The peculiar characteristics of wool, and those on which its valuable qualities chiefly depend, are the serrated characters of its surface, arising from its structure, which consists of a series or succession of inverted cones, the base of each being directed from the root of the woolly fibre and receiving the apex of the succeeding cone. It results from this structure, that the pressure to which the workman subjects the wool in moving it backwards and forwards brings the fibres together and multiplies their points of contact. The agitation gives to each hair a progressive motion towards the root, and the serrations of one hair fix themselves on those of another hair which happens to have its root turned in the opposite direction, and the mass at length assumes the compact form which is termed "*felted*" wool.

The wool of the sheep, from the remotest period of history, has been of primary importance to mankind, and it has been surprisingly improved by its domestic culture. The Mouflon, *Ovis aries*, the parent stock from which our sheep is undoubtedly derived, and which is still found in a wild state upon the mountains of Sardinia, Corsica, Barbary, Greece, and Asia Minor, has a very short and coarse fleece, more like hair than wool. When this animal is brought under the fostering care of man, the rank fibres gradually disappear, while the soft wool round their roots, little conspicuous in the wild animal, becomes singularly developed. The male most speed-

ily undergoes this change, and continues ever afterwards to possess far more power in modifying the fleece of the offspring than the female parent. The produce of a breed from a coarse-woolled ewe and a fine-woolled ram is not of a mean quality between the two, but half way nearer that of the sire. By coupling the female thus generated with such a male as the former, another improvement of one half will be obtained, affording a staple three fourths finer than that of the grandam. By proceeding inversely, the wool would be as rapidly deteriorated. It is therefore a matter of the first consequence in wool husbandry to exclude from the flock all coarse-fleeced rams.

Sheep's wool is of two different sorts, the short and the long stapled, each of which requires different modes of manufacture in the preparation and spinning processes, as also in the treatment of the cloth after it is woven, to fit it for market. Each of these is, moreover, distinguished in commerce by the names of fleece wools and dead wools, according as they have been shorn, at the usual annual period, from the living animal, or are cut from its skin after death. The latter are comparatively harsh, weak, and incapable of imbibing the dying principles, more especially if the sheep has died of some malignant distemper. The annular pores leading into the tubular cavities of the filaments seem in this case to have shrunk and become obstructed. The time of year for sheep-shearing most favorable to the quality of the wool and the comfort of the animal is towards the end of June and beginning of July.

Long wool is the produce of a peculiar variety of sheep, and varies in the length of its fibres from three to eight inches. Such wool is not carded like cotton, but combed like flax, either by hand or appropriate machinery. Short wool is seldom longer than three or four inches; it is susceptible of carding and felting, by which processes the filaments become first convoluted and then densely matted together. The shorter sorts of the combing-wool are used principally for hosiery, though of late years the finer kinds have been extensively worked up into merino and mousseline-de-laine fabrics. The longer wools of other breeds are manufactured into hard yarns for worsted pieces, such as waistcoats, carpets, bombazines, poplins, crapes, &c.

The wool of which good broadcloth is made should be not

only shorter, but generally finer and softer, than the worsted wools, in order to fit them for the fulling process. Some wool-sorters and wool-staplers acquire by practice great nicety of discernment in judging of wools by the touch and traction of the fingers. From a series of observations made upon different wools, the following results were noticed. The filaments of the finer qualities varied in thickness from $\frac{1}{1100}$ to $\frac{1}{1500}$ of an inch; their structure is very curious, exhibiting in a good achromatic microscope, at intervals of about $\frac{1}{2000}$ of an inch, a series of serrated rings, imbricated towards each other like the joints of *Equisetum*, or rather like the scaly zones of a serpent's skin.

There are four distinct qualities of wool upon every sheep, the finest being upon the spine, from the neck to within six inches of the tail, including one third of the breadth of the back; the second covers the flanks between the thighs and the shoulders; the third clothes the neck and the rump; and the fourth extends upon the lower part of the neck and breast down to the feet, as also upon a part of the shoulders and the thighs to the bottom of the hind quarters. These should be carefully torn asunder and sorted immediately after the shearing.

The harshness of wools is dependent not solely upon the breed of the animal, or the climate, but is owing to certain peculiarities in the pasture, derived from the soil. It is known that, in sheep fed upon chalky districts, wool is apt to get coarse; but in those upon a rich, loamy soil, it becomes soft and silky. The ardent sun of Spain renders the fleece of the Merino breed harsher than it is in the milder climate of Saxony. Smearing sheep with a mixture of tar and butter is deemed favorable to the softness of their wool.

All wool in its natural state contains a quantity of a peculiar potash-soap, secreted by the animal, called in the country the *yolk*, which may be washed out by water alone, with which it forms a sort of lather. It constitutes from twenty-five to fifty per cent. of the wool, being most abundant in the Mexico breed of sheep, and, however favorable to the growth of the wool on the living animal, should be taken out soon after it is shorn, lest it injure the fibres by fermentation, and cause them to become hard and brittle. After being washed in water somewhat more than lukewarm, the wool should be well pressed and carefully dried.

Lith. of E. C. Kellogg. Hartford, Conn

N° 14.

OSTREA EDULIS.

Common Oyster

HETEROGANGLIATA.

Invertebrated Animals.

No. 14.

OSTREA EDULIS.

COMMON EDIBLE OYSTER.

The animal substance.	*Testæ Ostreæ.* *The Shell.*	A medicinal agent.

Geog. Position. European and Indian seas.
Quality. Delicious, digestible.
Power. Aphrodisiac, lithontriptic.
Use. Aliment, phthisis, and some abdominal affections.

SCIENTIFIC ANALYSIS.

Natural Classification.

4. Division *Heterogangliata.* Class *Conchifera.*

Ballard and Garrod, Mat. Med. 453. Syst. Nat. Gmelin, VI. 3315. Pereira, Mat. Med. II. 769. Thompson, Mat. Med *71. Lond. Disp. 466. U. S. Disp. 735. Ec. Disp. U. S. 146. Jones, An. King. 379. Wyatt, Nat. Hist. 107.

Genus OSTREA.

Ecailles de Huîtres (Fr.), Austerschaalen (Ger.), Conchiglia d' ostrica (It.), Cascara (Sp.).

The Essential Characters.

Mollusks, acephalous, aquatic, with a bivalve or multivalve shell. The *mantle* opens in various ways, sometimes before, sometimes all around, and then again only upon one side.
Organs of respiration four pectinated laminæ.
Heart simple. *Touch and taste* the only senses certainly ascertained to exist.
Feet very small or entirely wanting.

The Secondary Characters.

Ostrea. *Body* compressed, more or less orbicular. Edges of the *mantle* thick, non-adherent or retractile, and provided with a double row of short and tentacular filaments. The two pair of *labial appendices* triangular and elongated. A subcentral, bipartite *muscle.* *Shell* irregular, inequivalved,

coarsely laminated. *Left or inferior valve* adherent, largest and deepest; its summit prolonged by age into a kind of keel. *Right or upper* valve smallest, more or less operculiform. *Hinge* oral, toothless. *Ligament* somewhat internal, short, inserted in a cardinal pit, growing with the summit. The *muscular impression* unique and subcentral.

The Specific Characters.

Ostrea edulis. *Shell* bivalve. *Valves* ovate-roundish or obovate. The upper one flat. *Lamellæ* of both valves imbricated and undulated. *Vulva* none.

NATURAL HISTORY.

The Oyster, *Ostrea edulis*, is a well-known edible mollusk, the shell of which is formed of two unequal valves connected together by a hinge of the simplest character. Externally the shell has a coarse and dirty appearance, each shell being composed of a great number of laminæ irregularly closed down on each other. In some species it is smooth, in others striated, tuberous, or prickly, the lower shell being always the deepest. The animal itself is also of very simple structure. No vestige of a foot can be seen, and the ligament which unites the valves is of small size. On separating the valves, four rows of gills, or what is called the *beard*, are observed at a little distance from the fringed edge of the mantle. The abductor muscle is situated at about the centre of the body, near which the heart is to be distinguished, and the mouth may be seen beneath a kind of hood formed by the union of the two edges of the mantle near the hinge. Many curious discussions have arisen as to whether oysters possess the faculty of locomotion. It is well known that in general they are firmly attached to stones or to each other, and it has been stated and generally believed that they are not endowed with any powers of changing their position. This much, indeed, is certain, that it is one of the most inanimate of the Mollusca, remaining fixed upon some submarine substance, enjoying only the nourishment brought it by the waves, and giving scarcely a sign of life, except the opening and shutting of its valves. In the British Museum there is a large specimen of a crab, to the back and claws of which a number of good-sized oysters have attached themselves. From the observations and experiments of naturalists it appears, however, that

they can move from place to place by suddenly closing their shells, and thus ejecting the water contained between them with sufficient force to throw themselves backward or in a lateral direction.

The principal breeding-time of the common oyster is in April or May, when their spawn is usually cast; this appears at first like little spots of grease, which fasten upon rocks, stones, or other hard substances that happen to be near. Very commonly they adhere to adult shells, and thus are formed the large masses termed oyster-banks. In about a year and a half they attain a size fit for the table, when they are taken by dredging, and stored in pits formed for the purpose, furnished with sluices, through which, in spring, the water is suffered to flow. In these receptacles they acquire a green tinge, which arises from the *confervæ* and other marine vegetable matter on which they feed. The powers of multiplication which oysters possess are so wonderful, that the *banks* or *beds* which they form occupy portions of the sea, in shallow parts extending for miles, and in some places (particularly along the alluvial shores of the Atlantic Southern States) walls of living oysters literally counteract the otherwise resistless force of the tide. Oysters are consequently particularly plentiful, and form a most important article of commerce. The breeding and fattening of them for market forms a separate and considerable branch of business. (For more details, see Spratt's *History of the Royal Society*, p. 307.)

From the spawning time till about June the oysters are said to be *sick;* but by the end of August they become perfectly recovered. In England the oyster fisheries are regulated by a court of admiralty, and after the month of May it is felony to carry away the *cultch* (which means any substance the oysters adhere to), and otherwise punishable to take any oyster between whose shells when closed a shilling will rattle.

The oyster is a very entertaining object to those who are fond of microscopic investigation. In the clear liquid around the animal many minute, round, living animalcules have been found, whose bodies, being unjoined, form spherical figures with tails, not changing their place otherwise than by sinking to the bottom, being heavier than the fluid; these have been frequently seen separating, and coming together again. In other oysters animalcules of the same kind were found, not

unjoined, but swimming by one another, where they seemed in a more perfect state, and were judged by Lewenhoek to be the animalcules in the roe or melt of the oyster.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

The officinal parts of oysters are the SHELLS, *Testæ Ostreæ.* The hollow valves are preferred. The shell is composed of carbonate of lime and animal matter, and was at one time supposed to possess peculiar medical properties; but analysis has shown that the only advantage of these animal carbonates of lime over those from the mineral kingdom arises from their containing no admixture of any metallic substance.

Oyster-shells require to be reduced to an impalpable powder before they are fit for medicinal employment, and their preparation in this way constitutes their sole pharmaceutical use. When thus prepared they form TESTA PRÆPARATA, *Prepared Oyster-shell.* Take of oyster-shell a *convenient quantity*, free it from extraneous matter, wash it with boiling water, and reduce it to powder. Throw this into a large vessel of water, stir it, and after a short interval pour off the supernatant turbid water into another vessel, and set it apart, that the powder may subside; lastly, let the water be poured off, and dry the powder.

Prepared oyster-shell differs from prepared chalk in containing animal matter, which, being very intimately blended with the carbonate of lime, is supposed to render the preparation more acceptable to a delicate stomach. It is given as an antacid in diarrhœa, in doses of from ten to forty grains or more, frequently repeated. A preparation has been introduced within a few years, under the name of *Castillen's powders*, consisting of sago, salep, and tragacanth, each in powder, a *drachm*, prepared oyster-shell a *scruple*, and sufficient cochineal to give color to the mixture. A drachm of this is boiled in a pint of milk, and the decoction used *ad libitum* as a diet in chronic bowel affections.

The flesh of the oyster furnishes a delicious article of food, and is more digestible in the raw state than when cooked, for the heat employed coagulates and hardens the albumen, and corrugates the fibrine, which are then less easily soluble in the gastric juice, and the heated butter generally used as an accompaniment adds still more to the indigestibility of the oyster.

Lith. of E.C. Kellogg, Hartford, Conn.

No. 15.

CYNIPS QUERCUS FOLII.

The Gall Insect.

HOMOGANGLIATA.

Articulated Animals.

No. 15.

CYNIPS QUERCUS FOLII.

GALL INSECT.

The animal substance. *Galls.* A medicinal agent.

Geog. Position. Asia Minor.
Quality. Inodorous, bitter.
Power. Astringent.
Use. Chronic diarrhœa, chronic dysentery.

SCIENTIFIC ANALYSIS.

Natural Classification.

3. Division *Homogangliata.* Class *Insecta.*

Cuvier, Règne Animale, t. v. 290. Olivier, Voy. Orient., t. 14 et 15. Ballard and Garrod, Mat. Med 394. Pereira, Mat Med. II. 199. Thomson, Mat. Med. *74, 659. Lond. Disp. 538. U. S. Disp. 352 Wyatt, Nat. Hist. 137. Ec. Disp. U. S. 337. Kost, Mat. Med. 484.

Genus CYNIPS.

Noix de Galles (Fr.), Gallapfel (Ger.), Galle (It.), Agalla de Levante (Sp.), Galnoot (Dutch), Gallaple (Swed.), Galdabel (Dan.), Galha (Port.), Maju P'hal (H. and San.), Makakai (Tam.), Afis (Arab.), Mazu (Pers.).

The Essential Characters.

Wings four, naked, membranous, veined longitudinally, the superior of which are always longer than the inferior.
Mouth composed of jaws and a labium very narrow (besides the labium and mandibles), forming a demi-tube more suitable for suction than mastication.
Envelope of the body not crustaceous.
Tarsi with five joints.
Abdomen generally attached to the thorax by a very slender pedicle, terminated in the females either by an ovipositor in the form of a saw, or by a simple retractile sting, which introduces an irritating fluid into the wounds it creates.
Metamorphosis complete.
Individuals three kinds, whose *color* and *form* vary greatly, — the *males*, the *females*, and the *neuters*.

The Secondary Characters.

Cynips. *Head* small. *Corselet* thick and high, which causes them to appear as if hunch-backed. *Wings* inferior, with a single vein.

The Specific Characters.

Cynips quercus folii. The females, towards the period of oviposition, assume a globular form and make punctures in plants (particularly in the *Quercus infectoria*), for the purpose of introducing their eggs, which cause excrescences denominated *gall-nuts.*

NATURAL HISTORY.

Hippocrates employed the nutgall (κηκίς) as an astringent, both internally and externally. Dioscorides describes it as the fruit of the oak, and the same error is found in the works of comparatively recent writers.

The leaves of the oak, of every species, and those of some other plants, display small excrescences on the petioles, produced by an insect; but the officinal gall is found only on the *Quercus infectoria*, whose geographical position is Asia Minor from the Bosphorus to Syria, and from the Archipelago to the frontiers of Persia. These excresences are the result of the puncture of the Cynips quercus folii (*Diplolepsis Gallætinctoriæ*), which is furnished with a *terebra*, or borer, by means of which it is enabled to perforate the foliaceous or cortical parts of plants, for the purpose of depositing its egg in the wound thus made.

This insect is a small hymenopterous fly, with a fawn-colored body, dark antennæ, and the upper part of the abdomen of a shining brown color. The ovipositor, as it is termed, of the female is long, slender, articulated, and so flexible that it is rolled up spirally and concealed within the abdomen when the insect is not using it; but it is so admirably constructed, that it can be run out and made stiff and firm at pleasure. With this little instrument the insect punctures the petiole of the oak-leaf, and deposits in the wound an egg too small to be seen by the naked eye, and probably also a drop of some irritating fluid. In a few hours the irritation which is induced in the part causes an afflux of fluids to it, the gall rises, and in a day or two attains its full size. It is

difficult to conceive how the insertion of so minute a body as the egg of the Cynips should cause so singular a divergence from the ordinary growth of the part. The simple puncture and the mere mechanical irritation are not sufficient to explain the phenomenon in a satisfactory manner; therefore it is thought that some acrid secretion is injected from the ovipositor along with the egg, which, acting locally, like any other acrid lymph which in the animal body produces a specific change in the structure of the part, is the chief cause of the irritation. Not the least singular circumstance is the rapidity of the growth of the gall, which, however large, attains its full size in a couple of days; and this is another reason for supposing that there is some fluid injected along with the egg, as the larva is not yet hatched. After a certain period the egg enlarges, the larva is hatched, and derives its nourishment from the gall; after some time it eats its way out of the prison, which then becomes lighter and contains much less of the astringent principle; the galls, therefore, that have a hole in them, are less valuable than the entire galls. The best galls are gathered before the fly has issued from them, and from galls of this kind very perfect specimens of the insect are frequently procured.

The oak on which the best galls are formed is the *Quercus infectoria*, a small, tortuous tree belonging to the natural order *Cupuliferæ*, and is thus described by Olivier. It has a crooked stem, seldom exceeds six feet in height, and more frequently assumes the character of a shrub than that of a tree. The leaves, which are deciduous in autumn, are on short petioles, smooth, of a bright green color on both sides, and obtusely toothed; the acorn is elongated, smooth, two or three times longer than the cup, which is sessile, in a slight degree downy, and scaly; the gall comes at the shoots of the young boughs, and acquires from four to twelve lines in diameter. Never more than one ovum is deposited in the gall, this fetal habitation being what entomologists term monothalmous.

The best galls are those of Aleppo, Smyrna, Magnesia, Karahisser, Diarbekir, and the interior of Natolia. They are termed *black*, *green*, or *blue* galls; those through which the insect has eaten its way out are called *white* galls. The galls formed on the *Quercus robur*, *Quercus cerris*, and other species of oak, are small, smooth on the surface, polished, reddish,

and not used. So also are galls formed on other plants, by beetles or other insects, of no medicinal use.

Black or blue nutgalls (*Gallæ nigræ* seu *cæruleæ*). Green nutgalls (*Gallæ virides*) are called by the natives *Yerli.* They vary from the size of a pea to that of a hazel-nut, and have a grayish color. The smallest have a blackish-blue tint, and are distinguished by the name of *black* or *blue galls*, while the larger and greener varieties are called *green galls.* Externally they are frequently tuberculated, but the surface of the tubercles and of the intervening spaces is usually smooth. Their texture is compact, but fragile.

White galls (*Gallæ albæ*) are for the most part gathered after the insect has escaped, and hence they are perforated with a circular hole. They are larger, lighter colored (being yellowish or whitish), less compact, less heavy, and less astringent.

Tannin, Tannic Acid, is a peculiar vegetable principle. It receives its name, Tannin, from the circumstance of its forming the principal agent in the operation of converting the skins of animals into leather; a process in which this principle, as obtained from various astringent vegetables, is precipitated upon the gelatine of the skins from water in which it is held in solution, and in which the skins, properly prepared, are placed; they are thus rendered impermeable to moisture, and capable of resisting putrefaction under the ordinary circumstances which favor it in untanned animal matters. This process is termed *tanning;* hence the French chemists named the principle on which it depends *Tannin.* It is an acid, and is now named *Tannic Acid.* It is a component of most astringent plants, and some diseased excrescences of such plants, as, for example, galls.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Galls are nearly globular in their form, varying in size from that of a pea to that of a large hazel-nut, and studded with tuberosities; they should be of a blackish-blue, or very deep olive color, heavy, compact, brittle, breaking with a flinty fracture, and their internal structure crystalline. They yield the whole of their active matter to water, the residue being inert and insipid. Alcohol and ether also take up a considerable portion of the active principle. They contain a

large quantity of tannic acid. The aqueous infusion reddens litmus. Sir H. Davy found 25 per cent. of tannin, 6.2 of gallic acid and extractive, 2.4 of mucilage, and 2.4 of saline and earthy matters, in galls; but Royer states that he obtains 125 grains of pure gallic acid from 500 grains of the galls; and Dr. Duncan thinks that Sir H. Davy has estimated the quantity of tannin too low; in one experiment with 500 grains of gall-nuts, Dr. Duncan obtained 220 grains, and in another 256 grains of soluble matter.

The chemist who has most successfully examined galls is Pelouze, who has obtained from them by means of ether from 40 to 60 per cent. of tannic acid. He recommends that powdered gall-nuts should be introduced into a tube closed at one end with a linen rag, and pouring over them sulphuric ether. The lower end of the tube is then inserted in a common jar or bottle. The ether gradually yields its water to the tannic acid, and forms with it a thick syrup, which is pushed into the bottle by the expansion of the ether above it. This syrup, which consists of water, ether, and tannic acid, being evaporated, leaves the latter in a state of purity. The acid, however, is more easily procured by a process recommended by M. Leionnot; namely, to macerate the powdered galls in ether and submit the pulp to the action of a strong press, repeating the process on the marc several successive times, until the gall-powder is exhausted, and then uniting the solutions, distilling off a portion of the ether at a low heat, and evaporating the residue in a water-bath.

Tannic acid, when pure, is nearly colorless, apparently but not regularly crystallized, inodorous, and powerfully astringent to the taste. It is unalterable in the air, and is easily pulverized. It is a true acid, capable of decomposing the alkaline carbonates with effervescence, and forming tannates with oxides. It dissolves readily in water, and is soluble in alcohol and ether. When exposed to the air in solution for a considerable time, it absorbs oxygen, which changes it into gallic acid. It is a curious fact, that, although tannic acid is a real acid, yet it is precipitated from its solution by nitric, phosphoric, hydrochloric, and arsenic acids. Protosulphate of iron produces no alteration on the solution of pure tannic acid; but the sesquisulphate immediately precipitates it in combination with the oxide, of a deep bluish-black color; if an excess of the solution be added, what remains undecom-

posed of the sesquisulphate is converted into the protosulphate, owing to the tannic acid attracting the oxygen. The precipitate is a compound of gelatine 54 + tannic acid 46 = 100, and is known under the name of *Tanno-Gelatine*. It affords a pretty accurate test of the quantity of tannic acid contained in any astringent vegetable infusion or decoction. If an excess of the solution of gelatine, however, be added to the vegetable infusion, the precipitate is re-dissolved. Lime-water and barytic water precipitate tannic acid from its solution, the precipitate being a compound of the earth and the acid; but when the earth is separated by an acid, the freed tannic acid again acts upon gelatine. It also precipitates all the salts of quinia, morphia, strychnia, and the other alkaloids from their solutions. From the analysis of Berzelius, the constituents of tannic acid appear to be: hydrogen 4,186, carbon 51,160, oxygen 44,654, in 100,000 parts; but according to Liebig it consists of 51.17 carbon + 44.09 oxygen + 4.12 hydrogen, or 18 eq. of carbon + 12 oxygen + 8 hydrogen, equiv. = 216.16. ($C_{18}\,H_{12}\,O_5$.)

Braconnot has discovered in galls a new acid, which he has called *Ellagic*, a word derived from reversing the word *Galle*, in French, and adding *ic*, — a singular and whimsical innovation in nomenclature. This acid possesses peculiar properties, is insipid, inodorous, white, with a slight tinge of red; and is insoluble in boiling water, on which account it is readily separated from gallic acid in the process of obtaining it. When ellagic acid is mixed with nitric acid and gently heated, the mixture acquires a red hue, and ultimately becomes blood-red; it is owing to the presence of this acid, therefore, that nitric acid, added to the infusion of galls and of oak-bark, produces a blood-red color. In the infusion of galls, the application of heat causes the partial decomposition of the nitric acid, nitrous fumes are emitted, and both the gallic and the ellagic acids are converted into oxalic acid.

In preparing galls for medicinal purposes, it is of importance to obtain the astringent matter as free from the other ingredients with which it is combined as possible. The galls should therefore be simply infused in distilled water of a temperature not exceeding 180°; this takes up little more than the tannic acid, but when the galls are boiled, the starch is partly converted into a *tannate*, which precipitates as the decoction cools. The infusion in cold water is a very delicate

test of the presence of iron in any liquid, and it is also an excellent test of the presence of morphia.

Tannic acid has been rarely procured in a state of purity. It is found chiefly in the inner bark of the roots and the stems of trees; sometimes it is contained in the wood, occasionally in the petals of the flowers, varying in character in different plants, owing to its combination with other principles. It has been employed, in its pure state, in uterine hœmorrhages; and M. Cavalier says it has succeeded in stopping these when many other astringents have failed. He gives it in doses of two grains every two hours. For this purpose it can be procured sufficiently pure from a solution of catechu in cold distilled water, filtered and evaporated to dryness. Tannic acid exposed to the air for some weeks is oxidized, and converted into gallic acid.

The incompatible substances with infusion or decoction of galls are very numerous. Many substances form precipitates with these preparations besides those which indicate the astringent character of the galls. Thus the infusion is precipitated by infusions of cinchona, cusparia, and calumba; solutions of opium, lime-water; carbonate of potassa; the acetates of lead; sulphates of copper and of iron; nitrate of mercury and of silver and potassio-tartrate of antimony; all of which are therefore incompatible in prescriptions with it. The sulphuric and hydrochloric acids cause flaky, white precipitates; nitric acid changes the color, first to deep orange and then to pale orange or yellow; and the astringency of the infusion is also greatly weakened. Although the nitrate of mercury throws down a clotted, bright-yellow precipitate, yet the bichloride, which is more likely to be ordered in conjunction with the infusion of galls, only renders the infusion milky. It is curious that so copious a decomposition of tartar emetic should take place on the addition of the solution of that salt to infusion of galls, when no precipitate is produced by it in decoction of oak-bark. No precipitates are thrown down with infusion of quassia, gentian, canella alba, orange-peel, saffron, ammonia, sulphate of zinc, and bichloride of mercury, which may therefore enter into the prescriptions with infusions of gall-nuts. By distillation *per se*, galls have been found to yield a concrete volatile oil, which Professor Branchi, the discoverer, regards as a component of galls; but some have considered it only the production of the opera-

tion. A solution of galls in ether is the most delicate test of the presence of salts of iron.

As an astringent, galls possess all the properties which can be expected from medicines of an astringent character; they are, nevertheless, seldom used as internal medicines. They enter the circulation, but previously produce a primary styptic influence upon the stomach, which, when the dose of the medicine is large, greatly incommodes the organ; hence, when internally administered, they are combined with other substances, usually with aromatics. For internal exhibition, the powder is certainly the best form of administering the medicine; the dose of galls may be from ten grains to one scruple, which may be given twice or thrice a day. They are frequently ordered in the form of gargles and injections; and an ointment formed of galls in fine powder, with eight parts of simple ointment and a small proportion of powdered opium, is a useful application to blind piles.

It is almost unnecessary to remark, that galls ought not to be powdered in an iron mortar.

TINCTURA GALLÆ, *L. D., U. S.* TINCTURA GALLARUM, *Ed.* *Tincture of galls.* Take of galls bruised *four ounces;* diluted alcohol *two pints;* macerate for fourteen days, express, and filter through paper.

This tincture may also be prepared by thoroughly moistening the galls, in powder, with diluted alcohol, allowing it to stand for twenty-four hours, then transferring it to a percolator and gradually pouring upon it diluted alcohol, until two pints of filtered liquor are obtained. *U. S.*

The *London College* directs *five ounces* of powdered galls, *two Imperial pints* of proof-spirit, and maceration for seven days; the *Dublin*, *five avoirdupois ounces* of the galls, *two Imperial pints* of the spirits, and maceration for fourteen days. The *Edinburgh College* takes the same quantity of materials as the London, and prepares the tincture either by digestion or percolation.

UNGUENTUM GALLÆ COMPOSITUM, *L.* UNGUENTUM GALLÆ ET OPII, *E.* *Compound ointment of galls.* Take of galls in very fine powder *six drachms*, lard *six ounces*, opium in powder *a drachm and a half.* Rub them together. *L.*

The *Edinburgh College* takes *two drachms* of galls, *a drachm* of opium, and *an ounce* of lard, and rubs them together into a uniform mass.

Lith of E C Kellogg. Hartford, Conn.

Nº 16.

CERVUS ELAPHUS.

The Stag.

VERTEBRATA.

Vertebrated Animals.

No. 16.

CERVUS ELAPHUS.

THE STAG.

The animal substance. *Hartshorn.* A medicinal agent.

Geog. Position. Europe, northern parts of Asia and America.

Quality. Inodorous, insipid.

Power. Nutritive, emollient, demulcent.

Use. A light and nutritious article of diet for the sick and convalescent, but this renders it useless as a medicine.

SCIENTIFIC ANALYSIS.

Natural Classification.

1. Division *Vertebrata.* Class *Mammalia.*

Ballard and Garrod, Mat. Med. 449. Syst. Nat. Gmelin. 175. Pereira, Mat. Med. II. 818. Thomson, Mat. Med. *70, 1172. Lond. Disp. 259. U. S. Disp. 284. Wyatt, Nat. Hist. 52.

Genus CERVUS.

Corne de cerf (F.), Hirschorn (Ger.), Corno di cervo (It.), Cuerno de ciervo (Sp.), Hertshoorn (Dutch), Hjorthorn (Swed.), Corne de veado (Port.).

The Essential Characters.

Incisors none in the upper jaw, in the lower usually eight. A vacant space between the incisors and molars, but in which in some genera are found one or two canines. *Molars* twelve in each jaw, the crown marked with two double crescents of enamel, of which the convexity is universally outwards in the lower jaw, and inwards in the upper.

Clavicles none. *Extremities* disposed for walking. Two *toes* furnished with hoofs, metacarpal and metatarsal bones united.

Stomachs four, the first and largest called the *paunch*, the second the *bonnet*, the third the *leaflet*, the fourth the *rennet*. *Intestines* long.

Mammæ two or four, inguinal.

Horns in the male and frequently in the female of most species.

The Secondary Characters.

Cervus. *Incisors* eight in the lower jaw. *Canines* none or sometimes solitary in the upper jaw; when they exist, compressed and bent back. *Head* long, terminated by a muzzle. *Eyes* large, pupils elongated transversely. *A lachrymal sinus* in most. *Ears* large and pointed. *Tongue* soft. *Body* slender. Four inguinal *mammæ*. *Horns* solid, deciduous, palmated, branched or simple in the males; females, with one exception, without horns.

The Specific Characters.

Cervus elaphus. *Horns* when tender covered with a velvety coat and growing at the apex. *Antlers* three, anterior, all curved upwards, the summit forming a crown of snags from a common centre. *Lachrymal sinuses. Fur* red-brown in summer, brown-gray in winter. *A pale disc* on the buttocks.

NATURAL HISTORY.

Both the Hart and the Hind, *the male and female stag*, are repeatedly mentioned in the Bible (Deut. xiv. 5; Psalm xviii. 33). The stag is also noticed by Hippocrates, Aristotle, Pliny, and other ancient writers.

Cervus, *the stag*, of which there are three known varieties, is a native of almost every part of America and Asia. In Britain its numbers have been much reduced by the progress of civilization, but it is still found wild in the highlands of Scotland, the moors bordering on Devonshire and Cornwall, and on the Kerry mountains in Ireland. Among the various animals which embellish the forests and animate the solitudes of nature, none are superior to the cervine race. These well-known ruminants are distinguished from the antelopes by their horns, which are composed of a bony substance, caducous, or falling off annually, and again renewed of a larger size than in the preceding year. The easy elegance of their form, the lightness of their motions, their size, their strength, their fleetness, and the extraordinary development of those branching horns, which seem fully as much intended for ornament as defence, all contribute towards placing them in the foremost rank of quadrupeds.

The stag is an animal of a stately, elegant form. When full-

grown he is commonly between four and five feet high; often, when he enjoys abundance of food, and lives undisturbed by man or the beasts of prey, he attains a much larger size. His legs are slender and elegant, tail short, horns lofty and branched. The female is of a smaller and more slender form, and destitute of horns. A reddish-brown color, which has gained this genus the appellation of red deer, distinguishes the upper part of the body; the hinder part of the neck and the space between the shoulders are marked with a black list; some part of the face is commonly black, the sides and under part are white. The stag loses and renews his horns annually, and for a while each set of horns is adorned with an additional branch. The young have no horns the first year; in the second year the horns are single and straight, and till the sixth, the number of the antlers continues to increase. From this period they are multiplied so irregularly, that the animal's age is estimated, not so much by the number of the antlers, as by the size and thickness of the whole horns. The sprouting horns are at first extremely tender, and covered over with bloodvessels. They grow, not, like the horns of the bull, the sheep, or the goat, by shooting out new matter at the roots, and moving forward that which is already formed, but, like trees and other vegetable bodies, increase their length by additions at the points. Delicacy and acuteness of the senses distinguish the stag in an eminent degree; his sense of smell is exquisite, his eye is sparkling, soft, and glowing with expression, he hears distinct and low sounds, and is not incapable of relishing the melody of music. One mode of hunting this animal, practised in ancient Greece, was for two persons to go out together, and one to charm the unsuspecting stag with the melody of his voice or his pipe, till the other approached near enough to pierce him with a dart or arrow. These animals run with great swiftness, living generally in forests, upon grass, leaves, and buds.

The horns of the stag differ from those of most other animals, and approach nearer to the nature of bone, only containing less of the phosphate of lime in their composition, and yielding a much larger proportion of gelatine. It is for the sake of the gelatine that their shavings are medicinally used. These are often adulterated with shavings of mutton-bones, which, however, are easily detected, by their greater degree of brittleness.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Pure hartshorn shavings, which are formed by planing down the internal white part of the horn, yield to water, by decoction, 27 parts of gelatine, + 57.5 of phosphate of lime, + 1.0 of carbonate of lime, + 14.5 of water, = 100.0 of the horn. The gelatine is inodorous and insipid, and has all the chemical properties of pure gelatine.

The retention of hartshorn in the list of the Materia Medica is the relic of a period of inert practice: it yields a light and sufficiently nutritious article of diet for the sick and the convalescent, but this very quality renders it useless as a medicine.

Gelatine, when freed from water by evaporation, so as to become brittle, is not susceptible of change, and may be kept for any length of time. For medicinal use it should therefore always be kept in the dry state. But when it is united with so much water as to render it tremulous, it soon undergoes decomposition, first becoming acid, then exhaling a fœtid odor, and putrefaction takes place. Exposure to the air is not necessary to effect this change in gelatine. When exposed to a high temperature it first whitens, then shrivels, and is carbonized: tremulous gelatine melts before it undergoes these changes. When tincture of galls or any astringent vegetable solution is dropped into a solution of gelatine; an insoluble precipitate takes place. This is *tanno*-gelatine, a compound of the gelatine and tannic acid, and it is this combination that produces leather. Gelatine, like gum, renders oils miscible with water, forming emulsions. Alcohol and ether do not dissolve gelatine, but they separate it from the water of its solution; in a thin solution, however, neither alcohol nor ether produces any obvious change. All the concentrated acids decompose gelatine, but diluted acids dissolve it unchanged. When chlorine gas is mixed with a solution of gelatine, a white solid matter, in filaments, is separated, which Bouillon la Grange has named *oxygenized gelatine*, but the nature of this change is unknown. The alkalies assisted by heat dissolve gelatine, but do not produce soaps. None of the earthy salts, with the exception of those of baryta, precipitate its solution; phosphate of soda, however, causes a slight milkiness in it. Among the metallic salts, nitrate of silver only precipitates the solution of pure gelatine.

Lith. of E. C. Kellogg. Hartford, Conn.

Nº 17

SANGUISUGA.

Blood sucking Leeches.

HOMOGANGLIATA.

Invertebrated Animals.

No. 17.

SANGUISUGA.

BLOOD-SUCKING LEECHES.

The animal. A medicinal agent.

Geog. Position. Europe.
Quality. Blood-sucking.
Power. Important therapeutic agent.
Use. Local abstraction of blood.

SCIENTIFIC ANALYSIS.

Natural Classification.

3. Division *Homogangliata.* Class *Annelida.*

Ballard and Garrod, Mat. Med. 461. Syst. Nat. Gmelin, I. 3095. Jones, An. King. 191. Pereira, Mat. Med. II. 770. Thomson, Mat. Med. 332. Lond. Disp. 373. U. S. Disp. 384. Wyatt, Nat. Hist. 112. Ec. Disp. U. S. 209.

Genus SANGUISUGA.

Sangsue (Fr.), Blutegel, Ægle, Lyche-lake (Ger.), Sangnisuca Mignatta (It.), Sanguijuela (Sp.), Pijavoka (Pol.), Jonc (Hind.), Jelauea (San.), Utter (Tam.), Khérulicen (Ara.), Zeloo (Pers.), Patchet (Malay), Lek, Leikeis (Mœso-Gothic), Læc, Lece (Saxon), Lækare, Læknare (Gothic and Swed.), Likær (Sclav.).

The Essential Characters.

Body more or less elongated, divided by a great number of transverse lines into numerous rings.

Skin soft, segmented and annulated.

Articulated members and wings absent.

Blood red, and circulates in a double system of arteries and veins.

Mode of reproduction, almost all hermaphrodite, though generally they require the congress of two individuals for impregnation.

The Secondary Characters.

Sanguisuga. *Body* elongated. *Back* convex. *Belly* flat. *Extremities* somewhat narrowed, furnished with discs or suckers. The anterior extremities somewhat narrower than the

posterior ones. *Rings* from ninety to a hundred. *Eyes* represented by ten blackish points. *Mouth* tri-radiate. *Jaws* cartilaginous, armed with numerous cutting teeth. *Anus* small, placed on the dorsum of the last ring.

THE SPECIFIC CHARACTERS.

Species I. SANGUISUGA OFFICINALIS, HIRUDO PROVINCIALIS, *the Green Leech.* *Back* greenish or blackish green, with six rusty-red, band-like longitudinal stripes. *Belly* olive-green, unspotted.

II. SANGUISUGA MEDICINALIS, HIRUDO MEDICINALIS, *the true English or Speckled Leech.* *Back* greenish, or olive-green, with six rusty-red longitudinal stripes which are mostly spotted with black. *Belly* greenish yellow, spotted with black. *Spots* very variable in size and number; in some cases they are but few, in others they are so numerous as to form the almost prevailing tint of the belly, the intervening spaces appearing like greenish yellow spots.

NATURAL HISTORY.

LEECH, *Hirudo.* A genus of suctional animals or red-blooded worms, of aquatic habits, provided with a sucker at both ends of the body; the greater part are inhabitants of fresh water; some, however, are only found in the sea, while others live in moist situations near stagnant water, pursuing earth-worms, &c. Many of them accumulate their eggs into cocoons, enveloped by a fibrous excretion, at first sight so closely resembling sponge in structure as to have been once mistaken by a distinguished naturalist for a new genus of that family.

The common Leech, *Hirudo medicinalis*, affords the most interesting example of a suctorial Annelidan, and principally deserves our attention. The outward form of one of these animals is familiar to every one, and their general habits too well known to require more than a very brief notice. The body is very extensible, and divided by a great number of transverse lines into numerous rings, extremely apparent in the contracted state of the animal, but nearly imperceptible when the body is elongated. The skin is soft, being merely a thin cuticular pellicle separable by maceration, and the surface is lubricated by a copious secretion of mucus. Beneath the cuticle is a layer of colored pigments, upon which the colors

of the animal depend, but the cutis or true skin is so intimately connected with the muscular integument of the body, that its existence as a distinct tunic is scarcely demonstrable. The muscular covering or walls of the body, which form a kind of contractile bag inclosing the viscera, are found upon accurate dissection to consist of three distinct strata of fibres running in different directions. The outer layer is composed of circular bands, passing transversely; in the second the fibres assume a spiral arrangement, decussating each other, while the internal layer is made up of longitudinal muscles extending from one end of the creature towards the opposite. Such an arrangment is evidently adequate to the production of all needful movements, and capable of giving rise to all the motions connected with the elongation, contraction, or lateral inflexions of the body used in progression.

At each extremity of the animal, the muscular coat expands into a flattened, fleshy disc, composed of circular and radiating fasciculi, which when applied to a smooth surface perform the office of suckers, and thus become important instruments of prehension. There are no vestiges of external limbs; nevertheless, with the simple mechanism above described, the leech is able to crawl with considerable rapidity along the surface of subaquatic plants, or even to swim with much facility through the water. The first method of locomotion is accomplished by means of the terminal suckers, supposing the posterior disc to be attached; the animal elongates its body to the utmost, and then fixes the sucker placed at the opposite extremity; this done, the hinder parts are drawn forward and again fixed preparatory to a repetition of the process. In swimming, the whole body is elongated, and, by some partial contractions of the muscular integument, not precisely understood, assumes the appearance of a flattened band, and in this condition the leech makes its way through the element which it inhabits by successive undulatory movements of the body, performed with much grace and elegance.

The mouth of the leech is an exceedingly perfect apparatus, not only adapted to the destruction of those minute aquatic animals which constitute its usual food, but, as is universally known, admirably fitted to extract blood from the higher animals, combining in its operation the offices both of the cupping-glass and the scarificator.

The mouth is situated near the centre of the anterior sucker,

so that the oval aperture is firmly applied to any surface upon which this part of the animal is fixed. Around the entrance of the œsophagus are disposed three minute cartilaginous teeth, imbedded in a strong circle of muscular fibres. Each tooth has somewhat of a semicircular form, and when accurately examined with a microscope, is found to have its free margin surmounted with minute denticulations, so as to resemble a small semicircular saw. On watching a leech attentively during the process of biting, the action of these teeth is at once evident; for as the skin to which the sucker is adherent is rendered quite tense, the sharp serrated edges of the teeth are pressed firmly against it, and a sawing movement being given to each cartilaginous piece by the strong contractions of the muscular fibres around the neck, these instruments soon pierce the cutis to a considerable depth, and lay open the cutaneous vessels, from which the creature sucks the fluid which its instinct prompts it to seek after with so much voracity. The position of the teeth around the opening of the mouth will at once explain the cause of the tri-radiate form of the incision which a leech-bite invariably and constantly exhibits.

On contemplating this singular dental apparatus found in the medicinal leech, and considering the nature of the food upon which it usually lives, it is difficult to avoid arriving at the conclusion that such a structure, which is indeed only met in one or two species, is rather a provision intended to render these creatures subservient to the alleviation of human suffering, than necessary to supply the wants of the animals themselves. In the streams and ponds which they usually inhabit, any opportunity of meeting with a supply of the blood of warm-blooded Vertebrata must be of rare occurrence, so that comparatively few are ever enabled to indulge the instinct which prompts them to gorge themselves so voraciously when allowed to obtain it; neither does it appear that the blood which they swallow with so much avidity is a material properly suited to afford them nourishment; for although it is certainly true that it will remain for a considerable time in its stomach without becoming putrid, yet it is well known that most frequently the death of the leech is caused by such inordinate repletion, provided the greater portion of what is taken into the body is not speedily regurgitated through the mouth.

The internal digestive apparatus is evidently adapted in the construction of all its parts to form a capacious reservoir for the reception of fluids taken in by suction; the stomach, indeed, with the numerous lateral appendages opening from it on each side, would seem to fill the whole body, and, being extremely dilatable, allows the animal to distend itself to a wonderful extent, so that it is not unusual to see a leech when filled with blood expanded to five or six times the dimensions which it presented in an empty state.

The stomach itself occupies about two thirds of the visceral cavity; on opening it, it is seen to be divided by delicate septa into nine or ten compartments, which communicate freely with each other. In each compartment there are two lateral orifices leading into as many wide membranous pouches, which, although shrunk and flaccid when in an undistended state, are easily filled with fluid introduced into the stomach, and are then swelled out into very capacious bags. Perhaps the simplest way of obtaining a correct idea of the relative sizes and general arrangement of these organs, is to make a cast of their internal cavities when in a state of distention; this is readily effected by placing a dead leech in warm water until it is slightly heated; in this state, the pipe of a small injecting syringe can be introduced into the œsophagus so as to fill the stomach and cæca with common wax injection, and if the body be immediately removed into a vessel of diluted muriatic acid, the soft parts will be speedily destroyed, leaving an exact model of the interior. It will then be seen that the lateral cæca increase gradually in size as they approximate the posterior extremity of the body, until the last pair become so large as nearly to fill up the space intervening between the end of the stomach and the anal boundary of the visceral cavity. What is the exact nature of these capacious sacs which thus open into the stomach of the leech? Are they prolongations of the digestive surface, or are they glandular cæca provided for the secretion of some auxiliary fluids poured into the stomach? These are questions which admit of considerable discussion. On the one hand, there can be little doubt that, when the leech is filled with blood, the various cæcal pouches become likewise distended, and they are apparently as well calculated to effect the digestion of their contents as the stomach itself. Those physiologists, however, who embrace a different opinion, support their views by refer-

ring to the structure of analogous parts found in other Annelidans. In *Aphrodita aculeata*, for example, the representatives of the wide pouches met with in the leech are narrow and branched tubes, terminating in blind extremities, to which it is usual to assign the office of separating a biliary secretion; and according to this view the cæca of the leech may be regarded as the simplest rudiments of the assistant chylopoetic glands; the first pair, from their proximity to the mouth, may be destined to furnish a salivary fluid, and the succeeding ones may be intended to perform the functions of biliary follicles.

The small size of the intestine, when compared with the capacious stomach described above, is remarkable; it commences by a minute orifice from the termination of the digestive cavity, and, becoming slightly enlarged, passes in a straight line, lodged between two posterior cæca, to the anus, which is an almost imperceptible aperture placed at the root of the posterior sucker; four small and apparently glandular masses are appended to this short canal, but their nature is unknown. The entire alimentary apparatus is retained *in situ* by numerous membranous septa, passing between its outer walls and the muscular parietes of the body.

The operation of digestion is extremely slow, notwithstanding the rapid and excessive manner in which the leech fills its stomach; a single meal of blood will suffice for several months, nay, more than a year will sometimes elapse before the blood has passed through the alimentary canal in the ordinary manner, during all which period so much of the blood as remains undigested in the stomach continues in a fluid state. This accounts for the reluctance of the leech, after being used to abstract blood, to repeat the operation; it not only being gorged at the time, but provided with a sufficient supply for so much longer. Indeed, the true medicinal leech does not seem to take any solid aliment, but subsists on the fluids of frogs, fish, &c.

The organs provided for respiration are a series of membranous pouches, communicating externally by narrow ducts or spiracles, as they might be termed, into which aerated water is freely admitted. These respiratory sacculi, in the leech, are about thirty-four in number, seventeen being visible on each side of the body; they are extremely vascular, and in connection with every one of them there is a long glandular-

looking appendage, represented until recently as being intended to furnish some important secretion, but which late discoveries have shown to be connected with the propulsion of the blood over the walls of the breathing-vesicle, in a manner to be explained immediately. It would seem, however, that the respiratory function is not exclusively carried on by the agency of the lateral sacculi; the entire surface of the body is permeated by innumerable delicate vascular ramifications, and from the thinness of the integument it is evident that the blood which traverses the cutaneous net-work thus extensively distributed must be more or less completely exposed to the influence of oxygen contained in the surrounding medium; nay, it would even appear from careful examination of the movements of the blood, as seen in the transparent bodies of some of the *Hirudinidæ*, that a kind of vicarious action occurs between the capillary vessels of the skin and those of the respiratory sacs, so that when the circulation proceeds languidly through one set of vessels, it is carried on with greater activity in the other.

The vessels appropriated to the distribution of the circulating fluid in the leech come now under consideration. There is no heart, but the movements of the blood are entirely due to the contractions of the canals in which it flows. The principal vascular trunks are four in number, which, although they all communicate extensively with each other, perform distinct offices in effecting the circulation; two of them being specially connected with the supply of the general system, while the other two seem subservient to the distribution of the blood over the respiratory sacculi.

The two systemic trunks run along the mesian line of the body, one upon the dorsal and the other upon the ventral aspect. The dorsal vessel seems to be arterial in its character, and no doubt corresponds in function with the heart of more perfect forms of the Articulata, receiving the blood from all parts of the system, as well from the respiratory vessels as from the venous capillaries, and by successive undulatory contractions, which may be observed to proceed from the tail towards the anterior extremity, propelling it through all the arterial branches derived from it. The ventral vessel, on the contrary, seems to be venous, collecting the blood after its passage through the systemic capillaries, and returning it partly into the dorsal artery from which it set out, and partly to the

lateral vessels for the necessary purpose of undergoing respiration.

The two lateral vessels are appropriated to the supply of the respiratory system, and in them the blood moves in a circle quite independent of that formed by the dorsal artery and ventral vein, although they all communicate freely by means of cross-branches, those passing from the lateral vessels to the dorsal being called by M. Dugés *dorso-lateral* (*Annales des Sciences Nat.*, Vol. XV.), while those which join the lateral trunks to the ventral canal are the *latero-abdominal* branches of that observer. The movement of the blood in the lateral or respiratory system of vessels is quite distinct from that which is accomplished in the dorso-ventral, or systemic trunks; sometimes it passes down the vessel from the head towards the tail, and in an opposite direction on the other side of the body, but in a short time the movement of the currents will be seen to become completely reversed, so that an undulatory motion, rather than a complete circulation, is kept up. By this action of the lateral canals, the blood is made perpetually to pass and repass the respiratory sacculi, and opposite to each of these, branches are given off which form so many independent vascular circles, representing very closely the minor or pulmonary circulation of the higher animals.

On examining attentively one of the respiratory pouches, its membranous walls are seen to be covered with very fine vascular ramifications, derived from two sources; the latero-abdominal vessel gives off a branch, which is distributed upon the respiratry sacculis, and there is another very flexuous vascular loop derived from the lateral vessel, which terminates by ramifying upon the vesicle in a similar manner. The walls of the loop are extremely thick and highly irritable, but on tearing it across, the internal cavity or canal by which it is perforated is seen to be of comparatively small diameter, so that it is not surprising that, although such appendages to the respiratory sacs were detected and well delineated by former anatomists, their nature was unknown, and they were supposed to be glandular bodies appropriated to some undiscovered use. From the arrangement above described, it is evident that small circular currents of blood exist, which are independent, to a certain extent, of the general circulation, since opposite to each membranous bag a portion of the fluid contained in

the lateral vessel is given off through the muscular tube, which thus resembles a pulmonary heart, and after being distributed over the walls of the respiratory vesicle, and in this manner exposed to the influence of oxygen, the blood returns into the general circulation.

The nervous system of the leech consists of a long series of minute ganglia joined by connecting filaments; of these about twenty-four are situated along the ventral surface of the body. The anterior pair, or that immediately beneath the œsophagus, is larger than the rest, forming a minute heart-shaped mass, which is united, by a delicate nervous collar embracing the gullet, with two small nodules of neurine situated upon the dorsal aspect of the mouth. The two minute ganglia last mentioned form that portion of the nervous system most intimately connected with sensation; for while the nervous filaments given off from the abdominal ganglia are distributed to the muscular integuments of the body, the nerves which issue from the supra-œsophageal pair supply the oral sucker, where the organs of the senses are situated. In all the Homogangliata, indeed, it is exclusively from this cephalic pair of ganglia that the nerves appropriated to the instruments of the senses are derived, and therefore this part of the nervous system of the Articulata is not improperly called the *brain*, and considered by most naturalists to be strictly analogous, in function at least, with the cerebral masses of more highly organized beings.

When the minute size of these as yet rudimentary nervous centres are regarded, it cannot be expected to find them associated with any very perfect apparatus of sensation. The oral sucker, indeed, seems to possess a more delicate sense of touch than the rest of the body, adapting it to examine the surface to which it is about to be fixed, and probably the leech may enjoy in some measure perceptions corresponding with those of taste and smell. These senses have been found to exist in many animals, but in the *Hirudinidæ* there are, in addition, distinctly formed organs of vision, exhibiting, indeed, the utmost simplicity of structure, but nevertheless corresponding in the perfection of their development with the condition of the cerebral masses in relation with them.

The eyes of the leech are eight or ten in number, and are easily detected by the assistance of a lens, under the form of a semicircular row of black points, situated above the mouth,

upon the sucking surface of the oral disc; a position evidently calculated to render them efficient agents in detecting the presence of food. The structure of these simple eyes does not as yet present any apparatus of transparent lenses adapted to collect or concentrate the rays of light, but each ocellus or visual speck would seem to be merely an expansion of the terminal extremity of a nerve derived immediately from the brain, spread out beneath a kind of cornea formed by the delicate and transparent cuticle; behind this is a layer of black pigment, to which naturally the dark color of each ocular point is due.

Leeches, like the generality of the Annelida, are hermaphrodite, every one possessing two complete systems of generative organs, one subservient to the impregnation, the other to the production of the ova; nevertheless, these animals are not self-impregnating, but the congress of two individuals is essential to fecundity.

Commencing with the male organs, it is not surprising to find the testes divided into numerous distinct masses, or rather repeated again and again, in conformity with a law to which allusion has already been had. The glands which apparently secrete the seminal fluid are about eighteen in number, arranged in pairs upon the floor of the visceral cavity. Along the external edge of each series there runs a common canal, or *vas deferens*, which receives the secretion furnished by all the testicular masses placed upon the same side of the mesian line, and conveys it to a receptacle where it accumulates. The two reservoirs or *vesiculæ seminales* communicate with a muscular bulb situated at the root of the penis. The penis itself is frequently found protruded from the body after death; it is a slender filament, which communicates by its origin with the contractile bulb, and when retracted is lodged in a muscular sheath. The male apparatus is thus complete in all its parts; the fecundating secretion derived from the double row of testes is collected by the two vasa deferentia, and lodged in the receptacles; it is thence conveyed into the muscular cavity situated at the root of the male organ of excitement, through which it is ultimately ejected.

The ovigerous or female sexual organs of the leech are more simple in their structure than those which constitute the male system; they open externally by a small orifice situated immediately behind the aperture from which the penis is pro-

truded, the two openings being separated by the intervention of about five of the ventral rings of the body. The vulva, or external canal, leads into a pear-shaped, membranous bag, which is usually, but improperly, named the uterus. Appended to the bottom of this organ is a convoluted canal, which communicates with two round whitish bodies; these are the ovaria. The germs, therefore, which are formed in the ovarian corpuscles escape through the tortuous duct into the uterus, where they are detained for some time prior to their ultimate expulsion from the body. The exact nature of the uterine sacculus is imperfectly understood; some regard it as a mere receptacle wherein the seminal fluid of the male is received and retained until the ova come in contact with it as they pass out of the body, and thus are subjected to its vivifying influence; other physiologists believe that the germs escape from the ovaria in a very immature condition, and suppose that during their sojourn in this cavity they attain to more complete development before they are ripe for exclusion; while some writers go so far as to assert that leeches are strictly viviparous, inasmuch as living young have been detected in the interior of this viscus. But all these suppositions are easily reconcilable with each other; there is no doubt that the seminal liquor is deposited in this reservoir during the copulation of two individuals; neither would any one dispute that the ova are collected in the same cavity before they are expelled from the body. As to the discussion whether the young are born alive or not, or, as it is generally expressed, whether leeches are oviparous or viviparous, it is in this case merely a question of words; for in a physiological point of view, it can make not the slightest difference whether the ova are expelled as such, or whether, owing to their being retained by accidental circumstances until they are hatched internally, the young leeches make their appearance in a living state.

The increasing scarcity of leeches renders their preservation and propagation objects of primary importance. The death of a vast number of leeches is occasioned by errors in the method of keeping them. Though aquatic animals, it is not enough that they be supplied with water. They breathe by their entire surface, and are accustomed to change their skins every four or five days. Their body is covered, like that of all animals and plants which inhabit the water, by a shiny or mucilaginous fluid, which not only enables them to glide

through the water, but keeps an aerial stratum in close contact with their respiring surface. When present in a limited degree, this mucous secretion is highly serviceable to them; in excess it is destructive. It is impossible for them to diminish it when it has accumulated, or to denude themselves entirely of their old skin in water only. They must have some resisting body to creep over or through, in order to accomplish this object. The most effectual method of preserving them appears to be that recommended by Fee, which is as follows: — "Into a marble or stone trough, a layer of seven inches of a mixture of moss turf and charcoal of wood is to be put, and some small pebbles placed above it. At one extremity of the trough, and midway between the bottom and the top, place a thin plate of marble, pierced with numerous small holes, upon which there should rest a stratum of moss or portions of the *Equisetum palustre*, or horse-tail, firmly compressed by a stratum of pebbles. The trough to be replenished with water only so high that the moss and pebbles should be but slightly moistened. A cloth is to be kept over the mouth of the trough. This is imitating as near as possible their natural condition, and the charcoal not only aids in keeping the water sweet, but appears to prevent the leeches being attacked by parasitic animals, to which they are very liable. The water should be changed about once a week, and more frequently in warm weather." To judge of the vast number of leeches that are required for medical use, and of the great importance it is to ascertain the best method of preserving them, it is only necessary to state, that four only of the principal dealers in London import between seven and eight millions annually.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Leeches derive their principal interest from the use that is made of them as a remedial agent; but it should be observed that there are only two species so employed, and these are principally derived from the South of France, Sweden, Poland, and Hungary. It is common for the leech-dealers to drive horses and cows into the ponds, that the leeches may fatten and propagate more abundantly by sucking their blood. Children are also employed to catch them by the hand, and grown persons wade into the shallow waters in the spring of the year, and catch the leeches that adhere to their naked

legs. In summer, when they have retired to deeper waters, a sort of raft is constructed of twigs and rushes, by which a few are entangled. They are also taken by laying baits of liver, to which the leeches resort and are then caught; but this last method is thought to make them sickly. A leech may be known to be in good health if it be active in the water and plump when taken out. The most certain method of inducing leeches to bite is to cleanse the skin thoroughly; and they should be exposed to the air for a short time previous to their application, as by this means they will bite more freely. If they are voracious, they may be applied to the part by being held lightly in the fingers, or they may be placed in a leech-glass, which is a preferable mode. They should not be disturbed whilst sucking, nor the patient be exposed to too great warmth, or they will fall off; this they should always be permitted to do of their own accord. When the leech has dropped off, it should be seized by the tail and drawn between the finger and the thumb so as to cause it to disgorge most of the blood; or this may be effected by putting it into a weak solution of common salt. It should then be placed in many successive fresh waters, and if not injured, it may be used again at a future time.

The corium, or true skin, which displays the rings of which the body of the leech is composed, seems to be semi-cartilaginous, and capable of expansion to nearly three times their natural magnitude; hence the quantity of blood which the leech can draw is greatly disproportionate to its natural size. Mr. Kennedy has stated, on the authority of experiment, that it is equivalent to the weight of the animal. M. Moquin Tandon affirms that a small lively leech will take twice its weight, a middle-sized one one half its weight, and a large one its weight. Derheim says six times its weight. The average, however, is considered about two drachms. This, nevertheless, is no criterion of what is obtained; for the blood continues to flow after the leech falls off, and by applying a poultice or warm water to the orifices, or a cupping-glass over the place, a considerable quantity may be afterwards abstracted.

There are some circumstances connected with the application of leeches that require to be noticed. An erysipelatous inflammation sometimes follows their application, which has been referred to a peculiar irritable state of the skin of the patient, but which has been ascertained by M. Derheim to

proceed from taking off the leech by force when it is sucking, thus causing the teeth to separate from the animal and remain in the wound.

The leech should therefore always be permitted to drop off spontaneously; and when it drops off, it should be thrown into water slightly salted, till it disgorges the blood, after which it should be thrown into clean water. It is curious that the circumstance of the leech dropping off when it is gorged has never suggested the question, What causes the leech to drop off? The usual reply to this question is, that the leech has had sufficient; or that it drops off from the uneasiness of distention. This, however, is not the fact; it drops because it falls into a state of asphyxia, from want of respiration, and this is founded upon the following grounds. The respiratory organs of the leech are a number of vesicles in immediate contact with the lateral longitudinal vessels, small twigs of which communicate with these vesicles, to submit the blood to the action of the air, which is admitted by stigmata or spiracles, which are arranged on each side of the under surface of the animal between every fifth ring. As the vesicles contain a whitish fluid, they are supposed not to be respiratory organs; that they are, however, breathing organs, is proved, for on closing these pores with viscid oil, the leech dies in a few days. Now, these vesicles communicate with the air; and although the leech can live for some days under oil, and in the exhausted receiver of an air-pump, yet, from an experiment made by Dr. Edwards, it is evident that the leech respires and consumes the oxygenous portion of the air; and it may be inferred that the animal, by filling these vesicles with air, can exist for some days without a fresh supply; but it by no means follows that they can exist if these vesicles be entirely emptied. It is therefore considered that the animal continues capable of exerting the function of sucking as long as these vesicles contain a sufficiency of air for the respiration to be carried on; but as the body becomes greatly distended with blood, the cavities of these vesicles are obliterated; no respiration can consequently take place; and, as in animals that breathe by lungs, asphyxia occurs as soon as air ceases to be retained in these vesicles, and the muscular energy depending on volition being no longer exerted, the leech drops off. If it be true that, when the tail is punctured or is cut off, the leech continues to suck, it is because no asphyxia

occurs; for the vesicles are not compressed, and therefore the leech continues to suck.

Various means have been suggested to facilitate the application of leeches; the part should not only be made clean and dry, as already directed, but the leech itself should also be dried in a clean cloth before applying it. Then place the leech in a glass or in the lid of a pill-box, and invert it upon the affected part; or if this fail, scratch the surface of the skin with the point of a lancet, and apply the leech on the spot moistened with blood. Perhaps the best and simplest method is, to fold up a clean, soft towel like a napkin, and make a small hollow in it with the point of the fingers, into which the dried leeches are to be placed. On applying the towel, it is to be held over the part by placing the hand on it until the leech bites, after which it is to be removed. If the skin be much inflamed and hot, a little tepid water should be poured into the water containing the leeches before they are taken out of it to be applied; and this should also be done. if it be requisite to apply them within the mouth, on the verge of the anus, or within the vagina. If the patient be taking sulphur internally, or externally applying it, leeches will not bite; neither will they bite if tobacco-smoke, or vinegar in vapor, or sulphur, or any fœtid odor, be diffused through the apartment of the patient.

When leeches are applied to soft parts, — for instance, to the abdomen, — a large quantity of blood is sometimes obtained, particularly when a poultice is laid over the bites, and the patient is kept warm in bed; to prevent, therefore, injurious symptoms of exhaustion from such a circumstance, the poultice should be frequently examined. Danger from this cause is more likely to occur in children than in adults, and in children it not unfrequently happens that the bleeding cannot be stopped without much trouble. The best method of stopping the bleeding, when ordinary means fail, is to crush to powder a small piece of nitrate of silver, and to melt the salt in a watch-glass over a candle, and then to dip into the melted salt the triangular pointed end of a silver probe, previously heated. The point becomes thus coated with the nitrate, and on introducing it into the leech-bites, they instantly cease to bleed. The bleeding may be stopped by encircling the orifice with a ligature. On this account, leeches should never be applied late at night on children, for as the application of

leeches in infancy must be regarded as a species of general blood-letting, the precise number which will regulate, not only the quantity, but be equivalent to rapidity in the detraction of the blood, should be determined; and the bites should be instantly closed on observing that the system is brought under the influence of the loss of blood. Instances have occurred in which death has followed the application of leeches to children, and sometimes even to adults.

By whatever means blood is abstracted, if the quantity be more than the constitution can bear to lose, morbid effects result. Thus, the *delirium* which frequently occurs has in some instances continued, and has worn out the patient. The first or second bleeding may be well borne, but a repetition of it may produce sudden dissolution; the pulse falls, becomes a mere flutter, and the person rarely survives more than a few hours. And this may happen whether leeches or the lancet be employed. Effusion into the ventricles is not an unfrequent consequence of an extreme degree of vascular exhaustion. Sometimes when reaction occurs, it is feeble and continues so, causing fainting on the slightest exertion, and sometimes terminating in sinking to a hazardous degree. In other cases the reaction produces symptoms resembling those of inflammation of the meninges of the brain, — a hard-beating pulse, particularly in the carotids, throbbing in the head, palpitation of the heart and pulsation of the aorta; and these symptoms in children lead us to suspect hydrocephalus, when nothing but exhaustion demands attention. Instead of blood-letting, light cordials, a mild and nutritious diet, rest, and quietude should be enjoined.

When the quantity of blood to be taken from any part is considerable, and especially if it be requisite to abstract it quickly, so as to produce an immediate effect, then cupping is preferable to the application of leeches. From the manner in which the blood is taken by cupping, syncope rarely occurs, unless from fear; consequently this method of abstracting blood is ill-calculated to produce a sedative effect upon the habit, although, in cases where the lancet has been previously employed, a degree of sinking occasionally occurs which is alarming. This, however, is less likely to happen than when leeches are employed, as, from the nature of the incision made by the scarificator, the bleeding is more under control than it is from the orifices produced by the bites of leeches.

Lith. of E C Kellogg,

Hartford, Conn.

Nº 18.

SEPIA OFFICINALIS.

Cuttle Fish

HETEROGANGLIATA.

Invertebrated Animals.

No. 18.

SEPIA OFFICINALIS.

CUTTLE-FISH.

Os Sepiæ.

The animal substance. A medicinal agent.

Cuttle-fish Bone.

Geog. Position. Europe.
Quality. Absorbent.
Power. Antacid.
Use. Tooth-powder, forming moulds, polishing, pounce.

SCIENTIFIC ANALYSIS.

Natural Classification.

2. Division *Heterogangliata.* Class *Cephalopoda.*

Brandt and Ratzeburg, Med. Zoölog. II. 299. Jones, An. King. 441. Pereira, Mat. Med. II. 770. Thomson, Mat. Med. *71. U. S. Disp. 1322. Wyatt, Nat. Hist. 103.

Genus SEPIA.

Sèche (Fr.), Der blackfisch (Ger.).

The Essential Characters.

Head rounded and provided with two large *eyes*, sessile. *Apparatus of hearing* situated in two little cavities, one on each side, without external meatus or semicircular canal, and inclosing a membranous sac in which is suspended a small stone.

Body inclosed in a bag, *mantle.*

Mouth armed with strong horny jaws, like the beak of a parrot; about its opening, long fleshy arms, extremely vigorous, capable of being flexed in every direction, and provided with *suckers.*

Branchiæ receive the venous blood under the influence of the contractions of two fleshy ventricles situated at the base of each. *Aortic heart,* composed of one ventricle only.

Stomach extremely complicated; a peculiar gland secretes a blackish humor, which is kept in a pouch, diversely situated according to the species.

The Secondary Characters.

Sepia. *Body* contained in a sac, bordered throughout its length by a narrow fin, and inclosing in the back a shell formed of an infinity of very small, fine, calcareous laminæ. *Mouth* surrounded with ten arms, of which two are much longer than the rest, and have suckers at the extremity only.

The Specific Characters.

Sepia officinalis. *Arms* small, with serrated cups. *Tentacula* two, longer than the arms. *Mouth* in the centre of the arms, horny, hooked like the bill of a hawk.

NATURAL HISTORY.

The Cuttle-fish, also called the *Ink-fish* (from the juice which the animal ejects, and which was used as ink by the ancients), is of an oblong form, about six inches in length and three and a half in breadth. The body is somewhat oval, but it is broadest near the head, and grows smaller towards the extremity, where it is obtusely pointed. The head is divided from the sac on all sides by a neck. The sac is furnished on each side, throughout its whole length, with a narrow fin. The suckers are irregularly scattered on the arms and feet. The back is strengthened by a complicated calcareous plate, which plate has been long known in the stores of the apothecary under the name of *Cuttle-fish bone*, and was formerly much prized in medicine as an absorbent, but is now chiefly sought after for the purpose of polishing the softer metals. The superior half, or the one next the head, is the longest, rounded at the extremity, and thin. The inferior portion becomes suddenly narrow, and ends in a point. It may be considered as consisting of a dormal plate, concave on the central aspect, having its concavity filled up with layers which are convex on their central aspect. The dormal plate consists of three different laminæ, arranged parallel to one another. The external or dorsal layer is rough on the surface, and marked by obscure concentric arches towards the summit, formed by minute knobs, which become larger towards the base, where they appear in the form of interrupted transverse ridges. It is uniform in its structure, and the tubercles possess a polish and hardness equal to porcellaneous shells, although they blacken speedily when put in the fire, and contain a good deal of animal matter. On the central side of this layer is

one flexible and transparent, similar to horn, and smooth on the surfaec. The third layer is destitute of lustre, and in hardness and structure resembles mother-of-pearl shells. The term *bone* has been improperly applied to this eomplicated plate, for this substance in composition is exactly similar to shell, and consists of various membranes, hardened by earbonate of lime, without the smallest mixture of phosphate. The *cuttle-bone* is formed in the same manner as other shells, by the continued addition of calcareous laminæ seereted by that side of the eontaining eapsule which is interposed between the shell and the abdominal viseera, and these layers, being sueeessively added to the ventral surface of the shell, thus gradually increase its bulk as the cuttle-fish advanees to maturity. Neither in the mode of its growth nor in its texture, therefore, does the *os sepiæ* resemble bone, properly so called; it receives neither vessels nor nerves, but is in all respects a dormal secretion embedded in the mantle and formed in the same manner as the dorsal plate of the *slug*.

In all the Cephalopoda, with the exception of the *Nautilus Pompilius*, there is an orifice in the immediate vicinity of the anus, through whieh a colored seeretion, generally of a deep brown or intense black color, can be poured in astonishing abundanee, and, beeoming rapidly diffused through the surrounding water, thus provides a means of defence; for no sooner does danger threaten, or a foe appear in the vicinity of the cuttle-fish, than this ink is copiously ejected, and the element around rendered so opaque and eloudy that the Cephalopod remains completely eoncealed from its pursuer, and not unfrequently insures its eseape by this simple artifiee. The organ wherein the inky secretion is elaborated is a capacious poueh lodged near the bottom of the visceral sac. On opening it and carefully washing away by copious ablution the ink within, the eavity of the ink-bag is seen to be filled up with a spongy cellulosity, wherein the blacking material had been entangled; and from this cellular chamber a duet leads to the outward orifice, through which the dark secretion is ejected at the will of the animal, and squirted from the extremity of the funnel.

The most remarkable speeies of the genus is the Sepia officinalis, whieh is distinguished from the others by its smooth skin. It inhabits the British seas, and although seldom taken, its "bone" is east ashore on different parts of the

coast, from the South of England to the Zetland isles. It is said that the cuttle-fish is considered a luxury by all classes of the Sandwich-Islanders, and that when fresh and well cooked it is excellent, being in consistence and flavor not unlike the flesh of a lobster's claw.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

The substance called Os SEPIÆ, or *Cuttle-fish bone*, is an oval or oblong calcareous bone (sometimes termed a shell) deposited in the mantle of the *Sepia officinalis*. It has a cellular texture, and is lighter than water, of a white color, a feeble odor of sea-plants, and a saline taste. It contains, according to John, from 80 to 85 per cent. of carbonate of lime, besides animal matter, a little common salt, and traces of magnesia. Reduced by levigation and elutriation to a fine powder, it may be given as an antacid, like chalk or oyster-shell. It is sometimes used as an ingredient of tooth-powders. Small pieces of it are often put into bird-cages, that the birds may rub their bills against them, and the powder is employed for polishing. A powder is also made from it called *pounce*, to prevent ink from spreading upon paper after erasures. It has been supposed that the celebrated paint so universally known as *Indian Ink* is made by the Chinese from the inky fluid of some animal of this kind.

Another useful product of the cuttle-fish is the blackish-brown fluid ejected by the animal. This is dried and used in the preparation of the water-color called SEPIA. That this juice was used as ink by the ancients, is well known.

> "Tunc queritor, crassus calamo quod pendeat humor,
> Nigra quod infusa vanescat *sepia* lympha;
> Dilutas queritur geminet quod fistula guttas." — Pers. Sat. III.

Compare Pliny (*Nat. Hist.* Lib. II. cap. 29), where he says that it was the property of this fish, when it was inclosed by a net, to shed a black juice, which so darkened the water that the fishermen could not see it. It is insoluble in water, but is extremely diffusible through it, and is very slowly deposited. When prepared with caustic ley, it forms a beautiful brown color, with a fine grain, and has given name to a species of drawing now extensively cultivated for landscapes and other branches of the fine arts. The honor of the invention of the sepic drawing is due to Professor Seidelmann, of Dresden, who discovered it at Rome in 1777.

Lith of E. C. Kellogg, Hartford, Conn.

N° 19.

HELIX POMATIA.

The Edible Snail.

HETEROGANGLIATA.

Invertebrated Animals.

No. 19.

HELIX POMATIA

THE EDIBLE SNAIL.

The animal substance. A medicinal agent.

Geog. Position. All parts of the world.
Quality. Slimy.
Power. Demulcent, restorative.
Use. Diseases of the lungs.

SCIENTIFIC ANALYSIS.

Natural Classification.

2. Division *Heterogangliata.* Class *Gasteropoda.*

Thomson, Mat. Med. *71. Jones, An. King. 397. Wyatt, Nat. Hist. 104.

Genus HELIX.

The Essential Characters.

Head more or less distinct and situated anteriorly, furnished with very movable appendages, *tentacula*, placed above the mouth, which are the seat of *touch*, perhaps of smell.

Eyes very small, sometimes entirely wanting, sometimes adhering to the head, sometimes fixed at the base, side, or point of the tentacula.

Respiratory organs of various forms, upon which depends the division of these animals into orders.

Locomotion effected by the aid of a fleshy disc, placed under the abdomen.

The Secondary Characters.

Helix. *Shell* complete, apparent, and globular. The opening a little encroached upon by the projection of the penultimate turn of the spire, and circumscribed in the form of a crescent. *Respiration* effected in a cavity, the narrow orifice of which they open and shut at pleasure. No *branchiæ.*

The Specific Characters.

Helix pomatia. *Head* prominent, with four tentacula. At the end of the larger pair are the *eyes*, minute, perfect. The

tentacula can be drawn inwards by a process resembling the reversion of the finger of a glove. On the back, a turbinated calcareous shell of sufficient capacity to allow the whole body of the animal to be lodged in its interior.

NATURAL HISTORY

The common garden snail of this country, and the edible snail of Europe, are well-known examples of a family of terrestrial and air-breathing Gasteropoda. In tropical climates, however, more striking ones are to be found. They are equally adapted to the hottest and the coldest climates, the most cultivated and the most barren situations. The work of Dr. Pfeiffer is the latest and the most elaborate on this group. In the works of Wood, Sowerby, Reeve, and others, a great number of species are figured. An inspection of the cases containing them in the British Museum will show how varied their forms are, and how beautifully colored are many of the species. There are some brought from the Philippine Islands, by Mr. Cuming, which when wet lose their color, but regain it when dry. This is owing to the nature of the epidermis.

The garden snail, *Helix aspersa*, and its allies, constituting the family *Helicidæ*, are closely allied to the slugs in organization, and differ from them in little else than in their being inclosed in a shell, which is univalve, spiral, sub-pellucid, and brittle, and has a semilunar aperture. Its head is furnished with four tentacula; on the superior pair the eyes are placed, while the inferior pair have no visual organs, but seem more exclusively adapted to the perception of tactile impressions. Both the upper and lower tentacula are retractile, and can be completely inverted, so as to be withdrawn into the interior of the body. Each tentacle is a hollow, flexible cylinder. When partially retracted, the extremity of the organ is drawn inwards, and two cylinders are thus formed, one within the other; if the outer cylinder is elongated, as in protruding the tentacle, it is at the expense of the inner one, and, on the contrary, the inner cylinder, when the organ is retracted, is lengthened as the other becomes shorter. Snails are hermaphrodites, and consequently they are all capable of laying eggs, which they carefully bury in the ground. These eggs are very numerous, and there have been found eighty in one heap. They are round, semi-transparent, about the size of a small pea, and covered with soft shells; they are also united to each

other by an imperceptible slime. When the snail leaves the egg, it is observed with a very small shell on its back, having only one whorl; but in proportion as it grows, the shell increases in the number of its spiral turns. The addition is always at the mouth, the first centre still remaining, the animal sending forth from its body that slime which hardens into a calcareous substance, and is still fashioned into similar convolutions. Thus fitted with its covering, which is light and firm, the snail finds itself well defended from external injury; and it has only to retire into its fortress to escape impending danger. It derives its chief subsistence from the leaves of plants and trees, and, although very voracious, is extremely delicate in its choice. When in quest of food, it moves forward by means of that broad, muscular skin which is sometimes seen projecting beyond the mouth of the shell; this is expanded before and then contracted with a kind of undulating motion. It is also able to ascend in a perpendicular direction, and has its progress facilitated by means of that viscous excretion which it emits whenever it moves. On this glutinous matter it can proceed slowly and in safety along a rugged path, or ascend trees and fences for the purpose of feeding, and it also descends by the same aid, without danger of falling and injuring its shell.

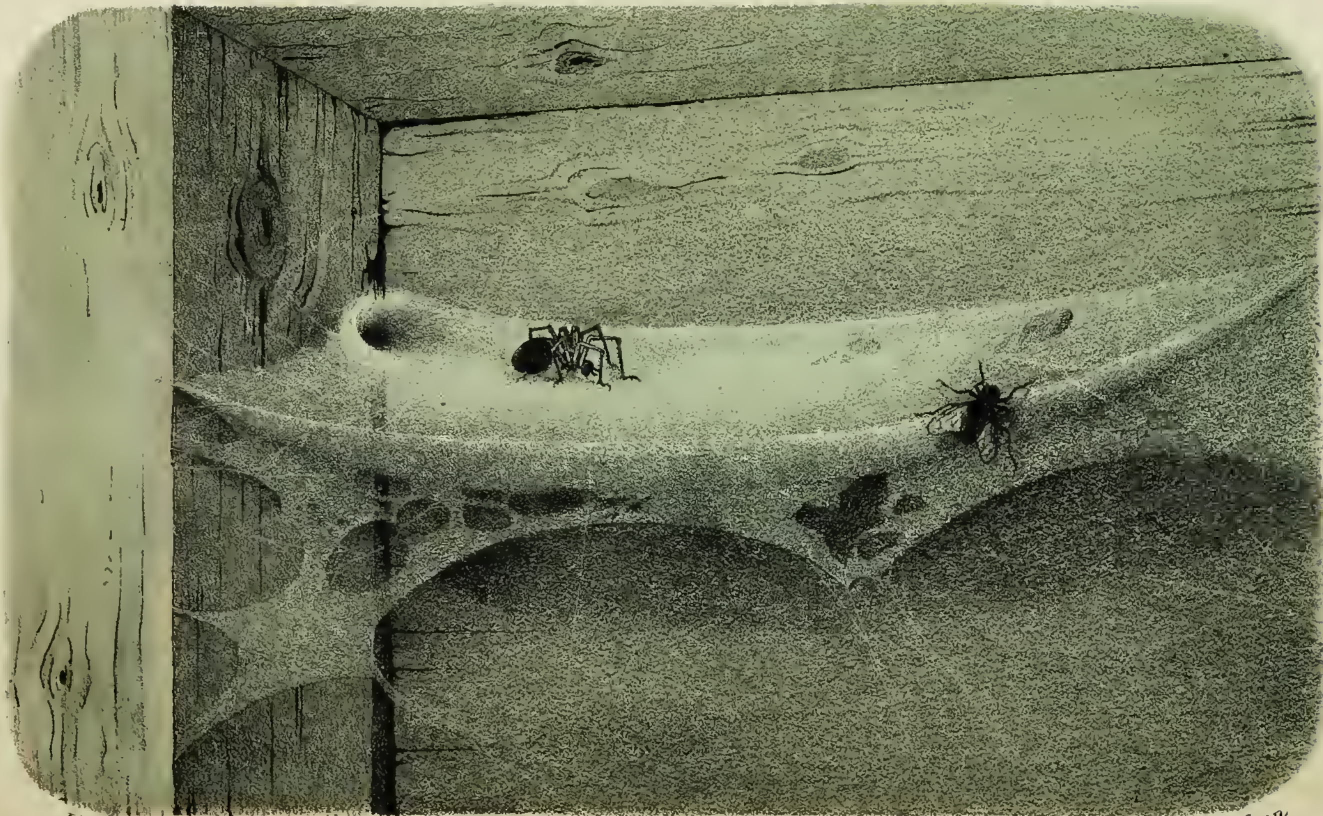
At the approach of winter the snail buries itself in the earth, or retires to some hole, where it continues in a torpid state during the severity of the season : thus it sometimes lies torpid for six or seven months, till the genial warmth of spring awakens it to a state of activity; when it quickly makes amends for its long abstinence by feasting on every vegetable substance that falls in its way. Before, however, they commence this inactive state of existence, snails close the mouth of their shells with an epiphragma (or covering not attached to or forming a part of the animal), which, stopping it up, entirely protects it from every external injury; it is composed of a whitish substance, somewhat resembling plaster. In the centre is an exceedingly minute orifice, communicating with the lungs; and this minute hole, though not large enough to admit a drop of water, is of sufficient capacity for the passage of air. The multiplication of snails is at times prodigious, and it is uniformly observed that a rainy season contributes much to their increase. It has been asserted, and on apparently good authority, that snails have been known to revive

after remaining in torpidity a number of years; and they also possess extraordinary powers of reproduction, being able to renew almost any part of the body that has been amputated, or of the shell that has been broken. This species of Mollusca is universally diffused throughout the continents of Europe, Asia, and Africa, (in America it is not so abundant,) in the hottest and coldest climates; in the forests of Guiana and Brazil, at the foot of Chimborazo, and even in the great desert of Zahara, the common snail will be found.

Among the members of the family Helicidæ, one genus deserves especial notice, from its structure. There are only two species known, *Anastosma depressa* and *Anastosma globulosa*. "The peculiarity," says Mr. Sowerby, "which distinguishes this genus from all the other Heliciform Univalves is so extraordinary, that it appears to us to be deserving of particular notice, inasmuch as it evidences a considerable alteration in the habit and economy of the animal which produces it, at the time of its arrival at the last period of growth, when it forms the reflected outer lip and the teeth in the aperture. Until then the animal must crawl about like other snails, with the spire of its shell uppermost; but as soon as it arrives at maturity, and is about to form its complete aperture, it takes a reverse position, and afterwards constantly carries its spire downwards." It is rare, and brought from the East Indies.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

The Helix pomatia, *Edible Snail*, was considered by the ancient Romans one of their table luxuries, and such great attention was paid to the mode of feeding them, that they frequently attained an immense size. On the shores of the Mediterranean they are still regarded as a valuable article of food when boiled in the shell, and eaten with rice. In some countries, as Switzerland and parts of France, they form a considerable article of commerce. They are fed by thousands in places called *escargatoires*, which are made on purpose for them. They are used boiled in milk for diseases of the lungs, and were sent to England from Italy as a great delicacy. Sir Kenelm Digby transported them from the South of Europe, and placed them on the grounds in the neighborhood of Boxhill, Kent, where they may still be found; but they do not attain to the size they often display in Italy.



Lith of E. C. Kellogg. Hartford, Conn.

No. 20.

TEGENERIA MEDICINALIS.

Spider, House-Spider.

HOMOGANGLIATA.

Invertebrated Animals.

No. 20.

TEGENERIA MEDICINALIS.

SPIDER, HOUSE-SPIDER.

Tela araneæ.

The animal substance. A medicinal agent.

Cobweb. Spider's web.

Geog. Position. Europe, America.
Quality. Sedative.
Power. Febrifuge, antispasmodic.
Use. Intermittents, spasmodic and nervous diseases.

SCIENTIFIC ANALYSIS.

Natural Classification.

3. Division *Homogangliata.* Class *Arachnida.*

Henz. Journ. Acad. Nat. Sci. II. 53. Jones, An. King. 308. U. S. Disp. 1316. Wyatt, Nat. Hist. 118. Ec. Disp. U. S. 398.

Genus TEGENERIA.

Toile d'araignée (Fr.).

The Essential Characters.

Skin like bark, but neither horny nor calcareous.

Head and thorax coalesce, leaving only two divisions of the body recognizable externally, viz. the *cephalo-thorax* and the abdomen.

Eyes invariably smooth, from two to twelve, grouped in various ways, never composite.

Abdomen distinct, short, and globular, and furnished near its posterior termination with *spinnerets*, by means of which is constructed what is usually named the *spider's web.*

Feet generally four pair, inserted at the thorax, and terminated by two, sometimes three hooks.

Respiration by pulmonary sacs, placed under the abdomen, or by ramified tracheæ, communicating with the external air by fissures or apertures called *stigmata* or *spiracula;* there are from two to eight of them.

Blood white, *circulation* in accordance with the mode of respiration.

THE SECONDARY CHARACTERS.

TEGENERIA. Never more than two pulmonary *sacs* placed under the abdomen, and communicating with the exterior air by spiracula. *Heart* consisting of a large cylindrical vessel, sending the blood through the arteries to the different parts of the body, and receiving by the veins that which has traversed the respiratory organs. *Feet* always four pairs.

THE SPECIFIC CHARACTERS.

TEGENERIA MEDICINALIS. *Eyes* arranged in a slightly curved line. These construct in the interior of our houses, in angles of walls, &c., an angular web, at the upper part of which is a tube in which they remain motionless.

NATURAL HISTORY.

The genus *Aranea* of Linnæus has been divided by subsequent naturalists into several genera, of which the *Tegeneria* of Walckenaer is the one that includes the medicinal species of spider. The *Tegeneria domestica* of Europe and *Tegeneria medicinalis* of this country are the particular species which have attracted most attention. These well-known animals, if not among the most admired, are undoubtedly among the most interesting of the annulose world from their habits and mode of life. They differ essentially in their internal structure from insects proper, and their external form is so peculiar that they are easily recognized. The family of spiders is not always arranged among insects, and, strictly speaking, their structure is different in some important particulars. The body is composed of two pieces only, the head being united with the thorax, and the feet are always eight in number. The cephalo-thorax appears as if composed of but a single segment, and is covered with a sort of horny buckler, generally oval, to which the abdomen, consisting of a soft and tumid mass, is appended. Generally they have eight eyes, though sometimes only six, variously disposed in the different genera, but always simple. The mandibles terminate in a very short movable hook, having near its extremity a small aperture, which serves as a passage for the poison. The legs are inserted almost in a circular manner around the cephalo-thorax; they are all nearly of the same form, and each is composed of seven joints, the last being

armed with two hooks. The pulmonary sacs are placed near the base of the abdomen, and indicated externally by a brownish or whitish spot. They are now arranged into groups or families, according to the arrangement of the mandibles and eyes, which correspond very remarkably with their respective modes of life.

The spider being formed for a life of rapacity, and incapable of living on any other than insect food, all its habits are calculated to deceive and surprise; it spreads toils to entangle its prey; it is endued with patience to expect its approach, and possesses power sufficient to destroy it when captured. For the purpose of constructing its web, Nature has supplied the spider with a large quantity of glutinous matter within its body, and with five papillæ or teats for spinning it into thread. This substance is contained in a little bag, and at first sight resembles soft glue, but when more accurately examined is found twisted into many coils of an agate color, and on breaking it the contents may easily be extended into threads from the tenacity of the substance,—not from those threads being already formed. The machine by which wire is drawn will furnish some idea of the manner in which this creature forms the thread of its little net; the orifices of the five teats through which the thread is drawn contracting or dilating at pleasure. The threads which are seen, and which appear so fine, are, notwithstanding, composed of five joined together, and these are repeatedly doubled as the work proceeds. When a house or a common spider is about to form a web, it first selects some commodious and secure spot, where insects appear to be in sufficient abundance. It then distils a small drop of its glutinous liquor, which is very tenacious, and, creeping up the wall, and joining its thread as it proceeds, darts itself in a very surprising manner to the opposite station, where the other end of the web is to be fastened. The first thread thus spun, drawn tight, and fixed at each end, the spider runs on it, backwards and forwards, still assiduously employed in doubling and strengthening it, as on its force depends the strength and stability of the whole. The scaffolding being thus completed, the spider draws a number of threads parallel to the first in the same manner, and then crosses them with others; the adhesive substance of which they are formed serving to bind them together when newly spun. After this operation, the wary architect

doubles and trebles the thread that borders its web, by opening all its papillæ at once; and so secures the edges as to prevent the wind from displacing the work. The edges being thus fortified, the retreat is next to be attended to, and this is formed like a funnel, where the little workman lies concealed. To this there are two passages or outlets, one above and the other below, very artfully contrived, to allow the animal an opportunity of making excursions at proper seasons, of examining every corner, and clearing those parts which become foul or encumbered. It often happens, also, that from the main web there are several webs extended at some distance on each side; these may be considered as outworks of the fortification, which, whenever touched from without, the spider prepares for attack or self-defence. If the insect infringing happens to be a fly, it springs forward with great agility; but if, on the contrary, some enemy stronger than itself, it then keeps within its fortress, and never ventures out till the danger is past. The spider also exhibits an instinct of a very uncommon nature. When put in terror by a touch of the finger, the spider runs off with great swiftness; but if he finds that, whatever direction he takes, he is opposed by another finger, he then seems to despair of being able to escape, contracts his limbs and body, lies perfectly motionless, and counterfeits every symptom of death. In this situation spiders have been pierced with pins, and torn to pieces without their discovering the smallest mark of pain. The simulation of death has been ascribed to a strong convulsion or stupor, occasioned by terror. But this solution of the phenomenon is erroneous and not satisfactory. The experiment has repeatedly been tried, and it is uniformly found, that, if the object of terror be removed, in a few seconds the animal runs off with great rapidity. Some beetles, when counterfeiting death, suffer themselves to be gradually roasted without moving a single joint.

The garden spider, *Epeira diadema*, appears to work in a different manner from that of the above. It spins a large quantity of thread, which, floating in the air in various directions, happens, from its glutinous quality, at last to adhere to some object near it, — a lofty plant or the branch of a tree. The spider is anxious to have one end of the line fixed, that it may be enabled to secure and tighten the other; it accordingly draws the line when thus fixed, and then, by passing

and repassing on it, strengthens the thread in such a manner as to answer all its intentions. The first cord being thus stretched, the spider walks along a part of it, and there fastens another; and, dropping thence, affixes the thread to some solid body below, then climbs up again and begins a third, which it fastens by a similar contrivance. When these threads are thus fixed, it forms a figure somewhat resembling a square, and in this the animal is generally found to reside. It often happens, however, when the young spider begins spinning, that its web becomes too buoyant, and not only the web floats in the air, but the spinner also. The struggles of an entangled insect communicate an undulatory motion to the whole web, which gives notice to the spider, who immediately sallies forth, and, if his victim be small, seizes it at once and sucks its blood; if, however, it is too large to be thus disposed of, the spider rolls it with his hinder foot, encircling it with a new thread at every turn, until sometimes the insect is completely coated, and it may be devoured at pleasure. Some spiders spin an irregular web, consisting of threads intersecting each other at every angle; others, again, make a horizontal, closely matted web, having a funnel-shaped retreat, into which they convey their prey; while others make only a retreat by binding a few leaves together, from which they sally forth and seize insects which approach them. Some of these seem to be extremely venomous, for it is observed that no insect that has been once bitten by them ever recovers, even though it be many times larger and more powerful than its adversary. Some are aquatic and spin a cup-like web, which answers the purpose of a diving bell, under which they disengage the air they bring down from the surface, and pass their lives feeding on aquatic insects. Some spiders spin no web, but take their prey by running; others by approaching quietly till within a certain distance, when they suddenly leap upon their prey; other spiders form perpendicular and cylindrical holes in the ground, into which they retreat on the approach of danger.

The female spider generally lays nearly a thousand eggs in a season, which are separated from each other by a glutinous substance. These eggs are small or large in proportion to the size of the animal that produces them. In some they are as large as a grain of mustard-seed, but in others they are too minute to be distinctly visible. The female never

begins to lay till she is two years old, and her first brood is never so numerous as when she arrives at full maturity. When the eggs have continued to dry for an hour or two after exclusion, the spider prepares a bag for their reception, where they remain to be hatched till they leave the shell. For this purpose she spins a web four or five times stronger than that intended for the catching of flies. This bag, when completed, is as thick as paper, smooth on the inside, but somewhat rough without; in this the eggs are deposited, and nothing can exceed the concern and industry which the parent manifests in the preservation of it. By means of the glutinous fluid it is stuck to the extremity of her body, so that when thus loaded she appears as if double. If the bag should happen by any accident to be separated from her, all her assiduity is employed to fix it again in its former situation; and this precious treasure she seldom abandons but with her life. When the young are excluded from their shells within the bag, they remain for some time in their confinement, till the female, instinctively knowing their maturity, bites open their prison and sets them at liberty. But her parental care does not terminate with their exclusion; she receives them on her back from time to time, till, having acquired sufficient strength to provide for themselves, they leave her to return no more and each commences a web for itself. The young ones begin to spin when they are scarcely large enough to be discerned, and discover their propensity to a life of plunder before nature has conferred on them strength for the conquest.

Spiders, it is said, though somewhat disgusting in their appearance in many other countries, are in Borneo of quite a different nature, and are the most beautiful of the insect tribe. They have a skin of a shell-like texture, furnished with curious processes, in some long, in others short, in some few, in others numerous, but are found of this description only in thick woods and shady places. Their colors are of every hue, brilliant and metallic as the feathers of the humming-bird; but are, unlike the bright colors of the beetle, totally dependent on the life of the insect which they beautify, so that it is impossible to preserve them.

In the *Excursions to Arran*, by the Rev. D. Landsborough, is an account of the persevering labors of an *Epeira*, "who had pitched his tent by the way-side," which is sufficiently interesting to warrant extracting nearly the whole of it. "The

spider is in kings' palaces," and kings and queens too may learn a lesson from it, as well as others. Spiders have not had justice done to them; they are a much more interesting race than many suppose. They improve on acquaintance; the better they are known, the more they are admired. At that time a whole colony of them were encamped by the road-side, within the compass of half a mile. "As he was rather a gigantic spider, his tent, instead of being on the ground, was elevated like the house of a giant of whom in early life most have been made acquainted. It was built on the tops of the common grass, *Holcus lamatus*, more than a foot above the ground. Had he built his house on the top of one stalk of grass, the house and its inhabitant might have borne down a single slender stalk. But he had contrived to bring together several heads whose roots stood apart, and with cordage, which he could furnish at will, had bound them firmly together, so that his elevated habitation was anchored on all sides. From whatever *airt* the wind blew, it had at once hawser and stay. Not only did he bind the heads together, but he bent, doubled, and fastened them down as a thatch roof, under which his habitation was suspended. As he was a larger spider than usual, his house was large; the more capacious department appeared to be the nursery, being below, and the smaller one his observatory or watch-tower, being above, from which he could pounce on his prey, or, in case of hostile attack, could make his escape by a postern gate, so as to conceal himself among the grass.

"During my visit in June last, on my return from Whiting Bay," says the reverend gentleman, "I was anxious to ascertain whether this interesting colony of tent-makers was still in a thriving state, and, not seeing any at first, I began to fear that a Highland clearance had taken place. But when I at last discovered a few of them, I saw that, as there are times of low trade among our industrious two-footed artisans in towns, so are there occasionally hard times among our six-footed operatives in the country. The field in which they encamped had probably become over-stocked. The stately *Holcus* had been eaten down, but these shifty children of the mist had availed themselves of the heather, — doubling down the tops of some of the heath-sprigs, and under this thatched canopy forming their suspension-tabernacles. As yet, however, it was too early in the season. The house had only one aperture, the

web of which it was formed was as yet thin, so that through it the spider could be easily seen, which, being but half grown, had not yet got in perfection its fine tiger-like markings. Go to the ant, thou sluggard; go also to the spider. He who taught the one taught the other, and, learning humility, let both teach thee."

It is said that kings might learn of the spider, and one of the greatest of Scottish kings, some five hundred years ago, disdained not to learn of an Arran spider, in the very district to which allusion is here made. The tradition still lingers in Arran, that *King's-cross Point* was so named because from this point in Arran, King Robert the Bruce sailed for Carrick, his own district in Ayrshire. When he was by a train of adverse circumstances almost driven to despair, it is said that, after a sleepless night in a humble cot on this rocky point, he in the morning observed from his lowly bed a spider actively employed in weaving her silken thread, for the purposes of a web. To make it firm and extensive, she endeavored to fasten her filmy threads on a beam projecting from the roof, but in attempting to reach this beam she fell down to the ground. Six times she repeated the attempt with no better success; but instead of being discouraged, she made a seventh attempt, — reached the wished-for point, fastened her adhesive cords, and went triumphantly on with her work. On observing this, the king sprang up with reviving hopes and fresh resolution. "Shall I," said he, "be more easily discouraged than this reptile? Shall she, in spite of repeated failures, persevere till crowned with success, though her object is to enslave and destroy? And shall I leave any thing untried that I may deliver from thraldom my oppressed subjects?" He hastened to the beach, launched a fishing-boat, sailed from *King's-cross Point* for Ayrshire, which he reached in safety, secretly assembled his liegemen in Carrick, made a bold and sudden and successful attack on his own castle of Turnberry, which he took from the vanquished English garrison, and following up this auspicious blow, he advanced on the side of victory, till at Bannockburn he drove the cruel invaders from the land, and once more set beloved Scotland free.

As has been already noticed, the species of the spider are very numerous, some differing widely from others; but the space we have already occupied compels us to confine ourselves in

the present instance to the general description already given of their structure, habits, &c. One particularity, however, in the history of spiders, remains to be noticed, which is their power of flight. This is chiefly exercised by those of minute size. It is principally in the autumnal season that these diminutive adventurers ascend the air, and contribute to fill it with that infinity of floating cobwebs, which are so peculiarly conspicuous at that period of the year. When inclined to make these aerial excursions, the spider ascends some slight eminence, as the top of a wall or the branch of a tree, and turning itself with its head towards the wind, darts out several threads from its papillæ, and, rising from its station, commits itself to the gale, and is thus carried far beyond the height of the loftiest trees. During their flight, it is probable that spiders employ themselves in catching such insects, minutely winged, as may happen to occur in their progress; and when satisfied with their peregrinations and their prey, they suffer themselves to fall by contracting their limbs and gradually disengaging themselves from the thread that supports them.

"We read in various works," says Vincent Kollar, "that spiders often eject a corrosive poisonous juice, in consequence of which the joints become inflamed and swelled; and even that the crawling of a spider is sufficient to cause inflammation in the parts which it touches. It might, perhaps, be too much to contradict the assertions of many writers," but our author says, "I have never found these observations adduced by men who have been exclusively occupied with the study of spiders, nor have I ever experienced any thing of this kind myself, throughout the many years in which I have been engaged in studying insects and spiders." All spiders are insects of prey, and feed on other insects, which they catch alive, kill, and then suck out their fluids. For this end they are mostly provided with very strong *cholæ* or mandibles. These *cholæ* are of a horny substance, bent inwards, hollow, and provided with an opening at the top, and are connected with glands which secrete a corrosive juice. They discharge this juice into the captured insects they have wounded, apparently to kill them sooner. The same thing happens when they wound a person who has caught one and gives it pain. Pain will naturally be the consequence of the wound, and the corrosive juice communicated to it, the wounded part becoming

inflamed and swelling. The larger the spider, the warmer the climate or season of the year, and the more susceptible the wounded individual, so much worse will the effects be; and it is therefore no wonder that people who would have a fester from a simple prick with a needle should feel more violent effects from the bite of a spider. Thus the bite of the Tarantula in Southern Italy, according to late observations, is said not to be nearly so dangerous as it was considered formerly, and the disease attributed to the bite of the Tarantula is said to be more the consequence of the climate and manner of life of the people. It is, however, an indisputable fact, that spiders defend themselves when they are persecuted and captured, bite with their *cholæ*, and drop into the wound a more or less poisonous juice, although the consequences are of little importance and the wound is very seldom dangerous.

There is a small Tick, so commonly called the Red Spider, *Acarus telarius*, that it may be described here. It is scarcely visible to the naked eye, and does considerable injury to various plants in warm, dry summers. It is also called the Plant Mite. Like most of the *Arachnidæ*, it has eight legs, its color changes from yellowish to brown and reddish, and on each side of the back is a blackish spot. In the open air it usually attacks kidney beans. Among trees the young limes principally suffer, and the mites are found in thousands on the under side of the leaves. These leaves assume a dirty yellow or brownish appearance, and in the middle of summer the trees acquire an autumnal hue. In hot-houses the red spider feeds during the whole year, and is a great pest to nurserymen and gardeners. It spins a sort of web over the leaves, particularly on the under surface, and sucks the juice of the plants with its rostrum, which completely enfeebles and defoliates them. Sprinkling the plants frequently with cold water has been found efficient as a means of destroying these insects; fumigating the hot-house repeatedly with strong tobacco smoke also injures them in some degree. They are most abundant when the plants are kept too warm in summer, and as most hot-house plants thrive well when placed in the open air in July and August, placing them out will almost entirely free them from these insects. When hot-house plants are placed in the open air, the precaution must be taken of sinking the pots in a warm dung or tan bed, to keep the roots

warm. The roots being preserved in this way, the plants will defy the coldest weather they are ever likely to be exposed to in the summer. For kidney beans, where they are trained on sticks in the open air, it is necessary in autumn and winter to cleanse the sticks from all loose rind, as the mites take up their winter quarters within it in whole families, and if they are not effectually destroyed, proceed from it to the young plants in the ensuing spring, and continue their devastations.

The Diadem Spider, *Epeira diadema*, so common in the autumn, belongs to Walckenaer's genus *Epeira*. Its body, when full grown, is nearly as large as a hazel-nut, is of a deep chestnut-brown color, and the abdomen beautifully marked by a longitudinal series of round milk-white spots, crossed by others of a similar appearance, so as to represent, in some degree, the pattern of a small diadem. It is chiefly seen during the autumnal season in gardens, where, in some convenient spot or shelter, it forms a large, round, close web of yellow silk, in which it deposits its eggs, guarding this web with a secondary one of a looser texture. The young are hatched in the ensuing May, the parent insects dying towards the close of autumn. At the top of the abdomen are placed five papillæ or teats, through which the spider draws its thread. The eyes, which are situated on the upper part of the thorax, are eight in number, placed at a small distance from each other. The fangs, with which the animal wounds its prey, are strong, curved, sharp-pointed, and each furnished on the inside near the tip with a small oblong hole or slit, through which is discharged a poisonous fluid into the wound made by the point itself. The feet are of a highly curious structure, the two claws with which each is terminated being furnished on their under side with several parallel processes, resembling the teeth of a comb, and enabling the spider to manage with the utmost facility the working of the threads in its web, &c.

The History of Spiders by Baron Walckenaer is the best work on the subject that has yet been published.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

The medicinal species of spider from which cobweb or spider's web is obtained, is the *Tegeneria medicinalis* of this

country. These webs are found in cellars, barns, and other dark places; they are of a brown or blackish color. They are reputed to possess extraordinary medical virtues, while those of the field spider are said to be inefficacious and of no account. Several very respectable authors speak in very decided terms of their powers, and recommend them as febrifuge, sedative, and antispasmodic. There are, however, various opinions among medical men as to the *modus operandi* of cobweb, some attributing it entirely to the control of the imagination, while others view it in a quite different light, and entertain favorable opinions of it as a powerful therapeutical agent.

According to Dr. Robert Jackson, *tela araneæ* is superior even to bark and arsenic in the cure of intermittents, and is moreover highly useful in various spasmodic and nervous diseases, controlling and tranquillizing irregular nervous action, exhilarating the spirits, and disposing to sleep, without producing any of the narcotic effects of opium on the brain. Among the complaints in which it has been found useful, besides intermittent fever, are periodical headache, hectic fever, asthma, hysteria, and nervous irritations attended with morbid vigilance and irregular muscular action. The dose of spider's web is five or six grains, to be given in the form of a pill, and repeated every three or four hours. Dr. Jackson states that its influence is not in proportion to the quantity administered, and that he obtained the same effects from ten as from twenty grains.

It will naturally be observed, that many of the complaints enumerated above are for the most part affections over which the imagination has much control, and if the supposition be allowed that the chief operation of this medicine is through the imagination, the observations of Dr. Jackson may well be accounted for.

Spider's web has also been used with asserted advantage as a styptic in wounds, and as a healing application in superficial ulcers.

Spiders themselves were formerly employed in the treatment of intermittent fever, and this application of the web is not of recent origin. The small silver-headed spider, given in a dough pill, is said to be a prompt and efficacious cure for ague, and has been very frequently and advantageously employed in domestic practice.

Lith. of E. C. Kellogg, Hartford, Conn.

No. 21.
ACIPENSER HUSO.
Sturgeon.

VERTEBRATA.

Vertebrated Animals.

No. 21.

ACIPENSER HUSO.

STURGEON.

The animal substance. *Ichthyocolla.* *Isinglass.* A medicinal agent.

Geog. Position. Ocean, Northern rivers of Europe and America.

Quality. Gelatinous, nutritive.

Power. Emollient, demulcent.

Use. Aliment for invalids, agent for clarifying or fining coffee, wines, beer, &c.

SCIENTIFIC ANALYSIS.

Natural Classification.

1. Division *Vertebrata.* Class *Pisces.*

Ballard and Garrod, Mat. Med. 487. Pereira, Mat. Med. II. 799. Thomson, Mat. Med. 1173. U. S. Disp. 400. Wyatt, Nat. Hist. 98. Ec. Disp. U. S. 218.

Genus ACIPENSER.

Ichthyocolle, Colle de Poisson (Fr.), Hausenbleu, Fischleim (Ger.), Colla di Pesce (It.), Cola de Pescada (Sp.).

The Essential Characters.

Skull and vertebral column for the protection of the brain and spinal marrow.

Blood cold and red, respiring by gills or branchiæ, and moving in the water by the aid of fins.

Ventrals attached under the pectorals.

Pelvis immediately suspended to the bones of the shoulder.

The Secondary Characters.

Acipenser. *Body* elongated, angular, and more or less covered with bony plates, implanted upon the skin in longitudinal rows. The exterior portion of the *head* well mailed. *Snout* pointed, conical. *Mouth* placed on the under surface of the head, tubular, and without teeth. *Branchiæ* free at

their external edge. A single orifice, very open, in each *operculum.* No rays to the *membrane.*

THE SPECIFIC CHARACTERS.

ACIPENSER HUSO. *Mouth* placed under the snout, small, and without *teeth.* Eyes and nostrils in the sides of the head. *Cirri* under the snout. *Dorsal* behind the *ventral*, and beneath it. *Caudal* surrounding the extremity of the spine, and having a salient lobe beneath shorter than its principal point.

NATURAL HISTORY.

STURGEON, *Acipenser.* A genus of large cartilaginous fish, allied somewhat to the shark and ray, but differing essentially in structure as well as in habits. There are several species of the Acipenser, from all of which, however, isinglass is readily obtained.

The COMMON STURGEON, *Acipenser sturio,* is generally about six feet long, but sometimes attains to the length of eighteen. It inhabits the Northern European and American seas, migrating during the early summer months into the larger rivers and lakes, and returning to the sea again in autumn, after having deposited the spawn. Its form is long and slender, gradually tapering towards the tail, and covered throughout the whole length by five rows of strong, large, bony tubercles, rounded at the base, and terminated above by a sharp curved point in a reversed direction. The body of the sturgeon is more or less covered with bony plates arranged in longitudinal rows, and the head is armed in a similar manner; the snout is long and slender, obtuse at the tip, and furnished beneath at some distance from the end with four long, worm-shaped cirri; the mouth, placed under the elongated muzzle, is small and toothless, and the palatal bones form the upper jaw; the air-bladder is very large, and communicates by a wide opening with the gullet. The pectoral fins are oval and middle-sized; the dorsal small, and situated very near the tail; the ventral and anal fins are also small, and placed nearly opposite the dorsal. The tail is lobed or slightly forked, the upper lobe extending far beyond the lower. The general color is cinereous above, with dusky specks, and yellowish-white beneath, and the tops of the tubercles are of a similar cast. Though generally considered as a fish of slow motion, it is sometimes seen to swim with great rapidity, and also to spring out of the

water with great force at intervals. It is rarely taken at any great distance from shore, but frequents such parts of the sea as are not remote from the estuaries of large rivers. In North America they appear in great abundance during the early summer months. The flesh of the sturgeon is white, delicate, and firm; it is said to resemble veal when roasted, but is generally eaten pickled, and the major part of that which comes to market in that state is either from the Baltic rivers or those of North America. It annually ascends the large rivers, but not in any quantities, and is occasionally taken in the salmon nets. From the roe, when properly salted and dried, is prepared the substance known by the name of *caviare*, but a very superior sort is made from a smaller species called the *Sterlet.*

STERLET, *Acipenser ruthenus*, is the smallest species of Sturgeon, being from two to three feet in length; it is found in the Volga and some other Russian rivers, and is considered a great delicacy. The caviare made from this fish is confined almost exclusively to the use of the royal table, and is esteemed a great luxury.

The largest species of Sturgeon, called the ISINGLASS STURGEON, *Acipenser huso*, is chiefly found in the Black and Caspian seas, ascending the tributary streams in immense multitudes. It frequently attains the length of twenty or twenty-five feet, and some have been taken weighing nearly three hundred pounds. It enters the rivers in the middle of winter, while they are still covered with ice, is very voracious, and pursues all the smaller fishes, but feeds likewise on vegetables. The fishery of this species is vastly important in the South of Russia, upwards of a hundred thousand being taken yearly.

The Sturgeon was a fish in high repute among the Greeks and Romans, and according to Pliny was brought to table with much pomp and ornamented with flowers, the slaves who carried it being also adorned with garlands and accompanied by music. Its flesh has indeed been esteemed in all ages, but modern nations do not consider it so great a luxury as the ancients. Its fishery, however, is an object of importance.

There is a membranous bag, placed in the anterior part of the abdomen of most fishes, communicating frequently, though not always, by means of a duct, with the œsophagus, and

containing usually a mixture of oxygen and nitrogen in various proportions. This has been denominated the *swimming-bladder*, because by its expansion or contraction it is supposed to enable the fish to rise or fall in the water. It is of different shape in different fishes, and consists of three coats, of which the two interior are thin and delicate, the outer tough and of a silvery whiteness.

The species of sturgeon from which THE BEST ISINGLASS is procured is particularly the *Acipenser huso* of Russia; but others, as the *Acipenser sturio*, *Acipenser ruthenus*, &c. (already noticed), furnish large quantities to commerce. Immense quantities are annually caught and consumed as food. The air-bags are removed from the fish, and, having been split open and washed in water in order to separate the blood, fat, and adhering extraneous membranes, are spread out, and when sufficiently stiffened are formed into cylindrical rolls, the ends of which are brought together and secured by pegs. The shape given to the roll is that of a staple, or more accurately that of a lyre, which it firmly retains when dried. Thus prepared, it is known in commerce by the name of *staple isinglass*, and is distinguished into the *long* and *short staple*. Sometimes the membranes are dried in a flat state, or simply folded, and then receive the name of *leaf* or *book isinglass*. The scraps or fragments of these varieties, with various other parts of the fish, are boiled in water, which dissolves the gelatine, and upon evaporation leaves it in a solid state. This is called *cake isinglass*, from the shape which it is made to assume. It is sometimes, however, in globular masses. Of these varieties the *long staple* is said to be the best, but the finest *book isinglass* is not surpassed by any brought to market. It is remarkable for its beautiful iridescence by transmitted light. *Cake isinglass* is brownish, of an unpleasant odor, and employed only in the arts. Inferior kinds, with the same commercial titles, are sometimes prepared from the peritoneum and intestines of the fish.

Isinglass little inferior to the Russian is made in Iceland from the sounds of the cod and ling. Considerable quantities of isinglass are manufactured in New England from the intestines of the cod, and of some of its allied fishes. This sort is in the form of thin ribbons, several feet in length, and from an inch and a half to two inches in width. Isinglass of a good quality has also been made in New York from the

sounds of the common hake, *Gadus merlucius*, which is thrown into water to macerate for a little while, and is then taken out and pressed between two iron rollers, by which it is elongated to the extent of half a yard or more. It is then carefully dried, packed, and sent to market.

An article called *refined* or *transparent isinglass* is made by dissolving the New England isinglass in hot water and spreading the solution to dry on oiled muslin. It is in very thin and transparent plates, and is an excellent glue, but retains a strong fishy odor. A preparation called *Cooper's gelatine* has been introduced as a substitute for isinglass in making jellies. It appears to be the dried froth of a solution of pure bone glue.

Brazilian Isinglass is imported from Para and Maranham, but it has not hitherto been ascertained from what fishes it is procured, though it is obvious, from a superficial examination of the commercial specimens, that they must have been obtained from several species or genera. It comes to market in the form of *Pipe*, *Lump*, and *Honeycomb.*

Pipe Brazilian Isinglass must have been procured from a large fish. It is prepared by drying the swimming-bladder unopened. In some cases this bladder is imported distended with air. The dried bladders or *pipes* are from ten to twelve inches in length, and from two to two inches and a half broad. Their weight is about five ounces. Their shape is somewhat conical, tapering at one extremity, and broader at the other, where on either side is a conical cæcal prolongation. It is devoid of smell, and is on that account less objectionable than the lump variety.

Lump Brazilian Isinglass consists of two swimming-bladders placed side by side, considerably separated at one end and communicating at the other extremity with each other. When perfect, each lump somewhat resembles in shape a torpedo. Its size varies.

Honeycomb Brazilian Isinglass appears to be the largest portion of the lump kind split open. The lump variety is sometimes softened and rolled out into thin ribbons. On account of its deeper color and inferior solubility, Brazilian isinglass is not in demand for domestic use, though as it is sold in the cut state it is probably intermixed with the finer kinds of Russian isinglass, and sold as such. As it is moderately cheap and soluble, while it is free from any fishy smell,

it is in extensive use for fining by brewers, who prefer it to either of the other sorts, and are the principal consumers of isinglass.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Isinglass. *Ichthyocolla* is not officinal, but it is still much used. The sounds of the perch, some species of the cod, and some other fishes, afford isinglass. The sturgeons, *Acipenser sturio*, *A. ruthenus*, *A. Güldenstadtii*, *A. stellatus*, and *A. huso*, from which the best is prepared, are caught in the rivers of Russia, in the Nile, and in the Caspian Sea, and occasionally elsewhere.

The isinglass is the prepared sound or swimming-bladder. It is taken from the fish, slit open, well washed, and freed from the thin membrane which covers it, then beaten, exposed to stiffen a little in the air, rolled and fixed in a peculiar shape by means of wooden pegs, or folded into leaves like a book, or simply dried without any care. The best isinglass is generally that which is rolled up and called *staple;* the next best kind is the *book isinglass;* there are inferior kinds, which are chiefly used for no other purpose than to adulterate the better kinds.

Isinglass of good quality is dry, whitish, semi-pellucid, and inodorous. One hundred grains of it should afford ninety-eight of matter soluble in water, which is *gelatine* and *albumen*, and scarcely two parts of solid, insoluble matter, which consists chiefly of *phosphate of soda* and *phosphate of lime.* It also contains *osmazome*, according to the analysis of Mr. E. Solly. M. Thénard has given this name to an extractive matter, contained in muscular flesh and in the blood of animals, which he considers of a peculiar nature. It has an agreeable smell and taste, and is found in *bouillons* of meat in the proportion of one part to seven of gelatine. Vanquelin discovered it in some fungi. It is the substance which gives the flavor of meat to soups, and hence its name, from ὀσμή, *smell*, and ζωμός, *soup*.

The same objections apply to isinglass as to gelatine as a therapeutical agent, and it is surprising that, while this gelatine is expunged from the last edition of the London Pharmacopœia, that of hartshorn is suffered to remain. It was formerly regarded as an antacrid, lubricating, and incrassating

remedy, but the experience of modern medicine has demonstrated it to be worthless as a remedy. It is useful for forming sticking-plaster, and it is also used for making gelatine capsules for copaiva.

As a nutrient, a solution of isinglass, acidulated with lemon-juice, and, when it is admissible, flavored with wine, is a very proper and agreeable food for the convalescent; but it is much less nutritive than the muscular parts of animals, and also less easily digested. In animal broths, gelatine is combined with oil, and if it can be regarded in the light of a remedy, it is in this form, in which it is ordered as an enema in the tenesmus of dysentery, and in ulcerations or abrasions of the lower portion of the intestinal canal.

The caviare of commerce is chiefly made from the eggs of the sturgeon, which exist in such abundance as to constitute nearly one third of the total weight. This is a very common aliment in Turkey, Russia, Germany, Italy, and especially in Greece, and forms an important article of commerce very profitable to Russia. The flesh of the sturgeon is nutritious, wholesome, and of an agreeable flavor. The fat may be used as a substitute for butter or oil.

Emplastrum Adhæsivum Anglicum. *Court-plaster.* It is made by brushing, first, a solution of isinglass, and then a spirituous solution of benzoin, over black sarcenet or silk. An excellent sticking-plaster, and which, when spread on white or pale-colored silk, allows the surgeon to see the progress of wounds, cuts, etc.

Gelatine is found in the skin, membranes, tendons, cartilages, and bones of land animals, and the sound or swimming-bladder of fishes, but not in any healthy animal fluid. It is a semi-transparent, brittle substance; it dissolves in cold water, but more readily in hot water, and in cooling assumes a semi-diaphanous, tremulous appearance. If in this state it be agitated for some time with cold water, a complete solution takes place.

Gelatine when freed from water by evaporation, so as to become brittle, is not susceptible of change, and may be kept for any length of time. For medicinal use it should therefore always be kept in a dry state. But when it is united with so much water as to render it tremulous, it soon undergoes decomposition, first becoming acid, then exhaling a fetid odor, and putrefaction takes place. Exposure to the air is

not necessary to effect this change in gelatine. When exposed to a high temperature, gelatine first whitens, then shrivels, and is carbonized; tremulous gelatine melts before it undergoes these changes. When tincture of galls or any astringent vegetable solution is dropped into a solution of gelatine, an insoluble precipitate takes place; this is *tanno-gelatine*, a compound of the gelatine and tannic acid; and it is this combination that produces leather. Gelatine, like gum, renders oils miscible with water, forming emulsions.

Alcohol and ether do not dissolve gelatine, but they separate it from the water of its solution; in a thin solution, however, neither alcohol nor ether produces any obvious change. All the concentrated acids decompose gelatine, but diluted acids dissolve it unchanged. When chlorine gas is mixed with a solution of gelatine, a white solid matter, in filaments, is separated, which Bouillon la Grange has named oxygenized gelatine, but the nature of this change is unknown. The alkalies, assisted by heat, dissolve gelatine, but do not produce soaps. None of the earthy salts, with the exception of those of baryta, precipitate its solution; phosphate of soda, however, causes a slight milkiness in it. Among the metallic salts, nitrate of silver only precipitates the solution of pure gelatine.

According to the analysis of Gay-Lussac and Thenard, the components of gelatine are, carbon 47.881, + oxygen 27.207, + hydrogen 7.914, + nitrogen 16.998, = 100.000. Such are the chemical characters of gelatine, but these differ in some particulars, according to the nature of the substances which yield it.

Gelatine is a nutritious article of food, though probably less so than fibrine and albumen. Notwithstanding it is readily digestible, it is not always suited to the digestive powers of many dyspeptics.

Gelatine may be considered as the least perfect kind of albuminous matter existing in animal bodies; intermediate, as it were, between the saccharine principles of plants and thoroughly developed albumen. Indeed, gelatine in animals may be said to be the counterpart of the saccharine principle of plants, it being easily distinguished from all other animal substances by its ready convertibility into a sort of sugar, by a process similar to that by which starch may be so converted.

8

Lith of E C Kellogg

Hartford, Conn

Nº 23.

ANNELIDA TERRICOLA.

Earth-worms.

HOMOGANGLIATA.

Articulated Animals.

No. 23.

ANNELIDA TERRICOLA.

EARTH-WORMS.

The animal substance. A medicinal agent.

Geog. Position. Abundant everywhere.
Quality. Softening.
Power. Emollient, lubricating.
Use. Inflammations, ulcerations, phlegmasia dolens.

SCIENTIFIC ANALYSIS.

Natural Classification.

3. Division *Homogangliata.* Class *Annelida.*

M. Dugés, Annales des Sciences Nat., Vol. XV. Willis de Anima Brutorum, 4to, 1672. Sir E. Home, Lectures on Comp. Anat., 4 vols. 4to, 1823. Hist. Insects, 202. Wyatt, Nat. Hist. 111. Jones, An. King. 201. Farmers' Encyc., *Article* Earth-worms. Neligan's Med. 38. Smellie, Phil. Nat. Hist. 80.

Genus ANNELIDA.

The Essential Characters.

Body always considerably elongated, and composed of a succession of rings or segments, which, with the exception of the first and last, scarcely differ from each other except in size. Each ring is generally found to be furnished with a set of short spines or setæ, calculated to assist in locomotion; in no instance are articulated legs provided.

Head, the first segment of the body, contains the mouth, sometimes provided with a formidable apparatus of jaws; and is also generally furnished with eyes and variously shaped tentacula, which are apparently instruments of touch.

Tail, the last segment of the body, is generally the smallest, and occasionally presents setiform appendages, and occasionally a prehensile sucker, used as an organ of progression.

Blood remarkable for its red color, and circulating in a double system of arteries and veins.

Respiration effected either in membranous sacculi contained within the body, or by means of arborescent tufts appended to various parts of their external surface.

Mode of reproduction, almost all hermaphrodite, and generally requiring the congress of two individuals for mutual impregnation.

The Secondary Characters.

Annelida. *Body* long, cylindrical, and formed by a great number of rings. *Eyes*, *tentacula*, or *branchiæ*, none. *Mouth* without teeth. *Instruments of attachment* totally wanting, the only external appendages to the body being a number of minute and almost imperceptible bristles, which project from the different segments and assist in progression.

The Specific Characters.

Annelida terricola. *Body* soft and compressible. No external *organs of respiration.* They attain sometimes to the length of a foot, and have as many as a hundred and twenty rings, each of which is furnished with little bristly projections which answer in some sort the purpose of feet. They live in general beneath the surface of the ground, perforating the soil in all directions.

NATURAL HISTORY.

The term Vermes, or Worms, has been used with great vagueness in natural history, and employed to designate animals to which the name is not appropriate. It is now, however, more restricted in its application, and is made to include only a small class of animals which have some circumstances in common, but still not exactly alike. They are sometimes called, by way of distinction, *Worms with red blood*, as they are the only invertebrated animals which have red blood; and sometimes *Annelides*, from the structure of their body, which is of a cylindrical, elongated shape, divided into a great number of rings.

The nervous system of the Annelidans resembles that of the Insects and Crustacea. Their organs of sense consist merely in some fleshy tentacula, which surround the mouth and answer the purpose of feeling and touching. Their blood is nearly of the color of that of the vertebral animals, but not of so bright a red. It circulates in a double system of vessels, but there is no distinct, fleshy heart to give it motion. They

breathe by means of branchiæ, which are sometimes within and sometimes without their bodies. They have no limbs, but a great number of rings, each of which is furnished with little bristles or spines for the purpose of locomotion. They emit through certain pores a slimy fluid, which lubricates their bodies and thus gives them an easier passage through the earth, which they traverse in every direction. They feed upon roots, woody fibres, and the remains of animal and vegetable matter. They swallow earth, also, in considerable quantity, but this is probably on account of the animal or vegetable matter which it may contain. When cut through the middle, each portion becomes a distinct individual.

The appearance of *earth-worms* is familiar to all, and in conformity with their habits, their entire structure is adapted to a subterranean existence, and their bodies so organized as to enable them to burrow with facility through the dense and unyielding materials in which they are usually found. Whoever has attentively watched the operations of an earth-worm when busied in burying itself in the earth, must have been struck with the seeming disproportion between the laborious employment in which it is perpetually engaged, and the means provided for enabling it to overcome difficulties apparently insurmountable by any animal, unless provided with limbs of extraordinary construction, and possessed of enormous muscular power. In the mole and burrowing cricket at once are recognized, in the immense development of the anterior legs, a provision for digging admirably adapted to their subterranean habits, and calculated to throw aside with facility the earth through which they work their way; but in the worms under consideration, deprived as they appear to be of all external members, feeble and sluggish even to a proverb, where is to be found that mechanism which enables them to perforate the surface of the ground, and to make for themselves, in the hard and trodden mould, the pathways which they traverse with such astonishing facility and quickness?

The structure of the outer fleshy integument of the earth-worm resembles, in every respect, that of the leech (No. 17), both in the annular arrangement apparent externally and the disposition of the muscular strata. The suctorial discs, however, which in the leech formed such important instruments of progression, are here totally wanting; and the annular segments of the body, as they approach the anterior extremity,

become gradually diminished in size, so as to terminate, when the worm is fully stretched out, in a fine point. But there is another circumstance in which the external anatomy of the terricolous Annelides differs materially from what is seen in the suctorial Abranchia. In the latter the tegumentary segments are quite naked upon their outer surface, but in the Lumbrici, now under consideration, every ring, when examined attentively, is found to support a series of sharp retractile spines or prickles. These, indeed, are so minute in the earth-worm, that, on passing the hand along the body from the head backwards, their presence is scarcely to be detected by the touch, but they are easily felt by rubbing the animal in the opposite direction; a circumstance which arises from their hooked form, and from their points being all turned towards the tail. These differences between the external structure of the suctorial and setigerous Abranchia, minute and trivial as they might seem to a superficial observer, are, however, all that are required to convert an aquatic animal into one adapted to a subterranean residence, as is evident on carefully observing the manner in which the earth-worm bores its way through the soil in which it lives. The attenuated rings in the neighborhood of the mouth are first insinuated between the particles of the earth, which, from their conical shape, they penetrate like a sharp wedge; in this position they are firmly retained by the numerous recurved spines appended to the different segments. The hinder parts of the body are then drawn forward by a longitudinal contraction of the whole animal; a movement which not only prepares the creature for advancing further into the soil, but, by swelling out the anterior segments, forcibly dilates the passage into which the head had been already thrust. The spines upon the hinder rings then take a firm hold upon the sides of the hole thus formed, and, preventing any retrograde movement, the head is again forced forward through the yielding mould, so that, by a repetition of the process, the animal is able to advance with the greatest apparent ease through substances which it would at first seem impossible for so helpless a being to penetrate.

The alimentary canal of the earth-worm is straight and very capacious. Its great size, indeed, is in accordance with the nature of the materials employed as food, for it is generally found distended with earth; and, indeed, by the older physiologists, these creatures were generally regarded as affording

proof that the nourishment of animals was not exclusively derived from animal and vegetable substances, since in this case they supposed nutriment to be obtained from matter belonging to the mineral kingdom. This supposition, however, has been long since exploded, for it is not from the earth that nourishment is afforded, but from the decaying animal and vegetable particles mixed up with the soil taken into the stomach; so that the exception to the general law of nature supposed to exist in the earth-worm, has no foundation in truth. The whole intestinal tract of one of these animals consists of a wide œsophagus, which terminates in a crop-like dilation; to this succeeds a muscular gizzard, and a long sacculated intestine, which passes in a direct line to the anus.

The circulation of the blood in the terricolous Annelidans has been the subject of much discussion, and until recently was but very imperfectly understood. In the earth-worm there are three principal trunks connected with the vascular system. First, a *dorsal vessel* runs along the whole length of the back, in close contact with the intestine, upon which it lies; this vessel is tortuous, and exhibits constant movements of contraction and dilatation, by which the blood is propelled in continuous undulations from the tail towards the head. Two other large vessels occupy the ventral region of the body; of these, one, which we shall call the *ventral vessel*, runs immediately beneath the alimentary tube; while the other, which is situated close under the skin, and consequently beneath the ventral chain of ganglia composing the nervous system, by which it is separated from the last, may be distinguished as the *sub-ganglionic vessel.* These three great trunks are united by important branches, and form two distinct systems; one of which is deeply seated, being distributed to internal viscera; the other is superficial, giving off innumerable vessels to the integuments of the body, which, by ramifying through the skin, form an extensive vascular surface adapted to respiration.

The ventral vessel, like the dorsal, may be traced quite to the anterior extremity of the worm, where numerous small anastomosing branches unite the two trunks; but these inosculations are of little consequence in describing the circular movement of the blood, a more important communication being established, through which the blood passes freely from one to the other, by the intervention of seven or eight pairs of large canals, situated in the immediate neighborhood of the

generative apparatus, with which, indeed, they are interwoven. Each of these voluminous vessels is composed of a series of swellings, or rounded, bead-like vesicles, endowed with considerable contractile power, and they form together a kind of heart of remarkable construction, which propels the blood received from the dorsal trunk into the ventral tube.

Along the rest of the body the communication between the dorsal and ventral trunks is repeated at each ring, by canals, which are much smaller than the bead-like or *moniliform* vessels, and have no vesicular arrangement; they run perpendicularly upwards, embracing the alimentary canal, and giving off branches at right angles, which divide into innumerable ramifications so as to cover the whole intestine with a delicate vascular network. These may be called the *deep-seated abdomino-dorsal branches.*

The *sub-ganglionic* vessel may be looked upon as arising from the termination of the dorsal vessel, with which it is evidently continuous at the anterior extremity of the body. At the posterior edge of every segment, a delicate branch is given off from this sub-ganglionic tube, which, running upwards in the same manner as those derived from the *ventral* trunk, joins the dorsal, and receives in its course a large anastomosing branch from the *deep abdomino-dorsal canal* which corresponds to it. From this system of superficial vessels arises a cutaneous network, analogous to that described above as covering the digestive viscera, which traverses the skin in all directions.

Now let the blood in its circulation be traced through this elaborate system. In the dorsal vessel the sanguineous fluid passes from the tail towards the head; at the anterior extremity of the body it passes partly into the sub-ganglionic vessel, through the anastomosing branches, and partly into the ventral vessel, into which it is forcibly driven by the contractions of the moniliform canals. In both the ventral and sub-ganglionic trunks, therefore, the course of the blood is necessarily from the head towards the tail; and the circulating fluid is continually returned to the dorsal canal by the deep and superficial abdomino-dorsal vessels completing the vascular circle.

On reviewing the above arrangement, it is immediately perceived that, notwithstanding the similarity observable in the distribution of the ventral and sub-ganglionic systems of vessels, in a physiological point of view, they are subservient to very different functions; the former representing the systemic,

the latter the pulmonary circulation. The blood derived from the dorsal trunk by the moniliform hearts is supplied by the ventral vessel, which may be compared to an aorta, over the surface of the viscera, and the remnant of this blood, after furnishing materials for nutrition, is returned to the dorsal canal by the deep vessels; but that portion of the circulating fluid which passes from the termination of the dorsal tube into the sub-ganglionic trunk, not only serves for the nourishment of the skin and muscular integument, but at the same time is brought in contact with the air as it passes through the cutaneous network, and is thus more or less replenished with oxygen before it is again returned to the general circulation. The sub-ganglionic canal is therefore a kind of pulmonary artery, and the dorsal drives to the moniliform vessels a mixed fluid, composed partly of venous blood derived from the viscera, and partly of arterial, derived from the superficial or subcutaneous system.

Thus, therefore, the extensive diffusion of vascular canals immediately beneath the surface of the skin must undoubtedly contribute materially to effect those changes in the blood which are analogous to those produced by respiration in the higher animals; but it would seem that this is not the only provision made for the aeration of the circulating fluids. It is long since Willis (1672) described the existence of a series of pores upon the back of the earth-worm, which he regarded as stigmata, and had remarked that air blown into these openings is dispersed between the muscular integument and the intestine, so that it passes readily from one segment to another. Dugés repeated these experiments with the same result, and found that the pores alluded to, instead of terminating in muciparous follicles, as they were supposed to do by many, penetrate into the interior of the body, so that air injected into one of them passes freely along the membranous compartments which surround the intestine, and escapes through other neighboring orifices. In like manner, water is found to be taken into the body through the same apertures, from which it is often given out in great abundance when the animal is too rapidly dried by exposure to the sun, or irritated by external stimuli. Aerated water, thus taken into the system, and brought immediately in contact with the deep-seated vascular net-work dispersed over the intestinal parietes, must therefore necessarily contribute to the respiratory function.

Nevertheless, in addition to all this is found in every segment of the body a pair of membranous vesicles communicating externally by lateral orifices, apparently analogous to the respiratory vesieles of the leech; and in fact, by many they have been described as constituting the breathing apparatus. Their real office, however, is but imperfectly understood; they evidently have not the same relation with the circulatory system, which the lateral sacculi of the leech are found to exhibit. Are they then merely secreting follicles, destined to furnish a mucosity for lubricating the external surface of the body, or are they aquiferous tubes adapted to introduce water into the interior? Future observations must determine.

Few points connected with the history of the earth-worm have given rise to so much speculation as the manner of their reproduction. The generative organs have long been known to be lodged in the anterior part of the body, their position being indicated externally by a considerable enlargement or swelling, which extends from the seventh to about the fourteenth segment, counting from that in which the mouth is situated. On opening this portion of the animal, a variable number of white masses are found attached to the sides of the crop and gizzard, which have long by general consent been looked upon as forming the reproductive system. Some have been regarded as representing the testes, others the ovaria: yet so delicate are the connections which unite these glandular masses, and such the difficulty of tracing the ducts whereby they communicate with the exterior of the body, that the functions to which they are individually appropriated have given rise to much discussion. The Lumbrici have been generally acknowledged to be hermaphrodite, that is, possessed of organs adapted both to the formation and fertilization of ova, and it is likewise well understood that the congress of two individuals is essential to the fecundity of both. In the earlier summer months, two of these animals are found to come partially out of the ground from contiguous holes, and, applying together those segments of their bodies in which the generative glands are situated, are observed to remain for a considerable time in contact, joined to each other by a quantity of frothy spume, which is poured out in the neighborhood of the sexual organs. No organs of intromission, however, have ever been distinguished; neither until recently had the canals communicating between the sexual orifices and the tes-

ticular or ovarian masses been satisfactorily traced; so that Sir Everard Home was induced to believe that, in the kind of intercourse above alluded to, there was no transmission of impregnating fluid from one animal to the other, but that the excitement produced by mutual contact caused both the ovaria and testes to burst, so that the ova escaping into the cells of the body became there mingled with the spermatic secretion, and being thus fertilized, the ova were hatched internally, and the young, having been retained for some time in the cells between the intestine and the skin, were ultimately ejected through apertures which were supposed to exist in the vicinity of the tail. There is, however, little doubt that what Sir E. Home conceived to be young earth-worms were in reality parasitical Entozoa, and that in the mode of their propagation the animals under consideration exhibit but little deviation from what is seen in the leech.

Besides the ordinary mode of propagation by ova, it has long been ascertained that some of the Annelida at least are reproduced by spontaneous division. Bonnet, Müller, and Dugés all agree that this is the case with certain species of Nais; and in *Nais filiformis* the process of separation has been witnessed from its commencement to its termination. The division was seen to occur near the middle of the body of the animal, the posterior half remaining motionless upon the mud of the bottom of the vessel, whilst the anterior portion buried itself as usual; after some days the truncated extremity of the hinder part was observed to become swollen, transparent, and vascular, and ultimately to assume the complete structure of the mouth of the perfect animal; it then buried itself in the mud, and no doubt there completed its development.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

Earth-worms may be used to diminish the vital tone or cohesion of the solid tissues of the body, and thereby render them more lax and flexible. They very effectually diminish acrimony, and protect the sensible surface of the body from the action of acid matter. The immediate advantage of these medicinal agents has been stated by many to act merely mechanically, by lubricating and softening the parts to which they are applied, or by sheathing them from the action of

matters which are capable of irritating them. They therefore seem to act either directly on the part to which they are applied, or indirectly through the medium of the circulation. *Annelida terricola* have not been analyzed. Their constituents, as well as their effects and uses, are doubtless as yet not well understood. They are principally employed in the treatment of inflammations, either general or local, and in painful ulcerations. Great advantage, however, has been obtained by their use in obstinate cases of *phlegmasia dolens* and *hydarthrus.* Take a handful of earth-worms and stew them in lard. With this mixture rub or bathe the legs or hips two or three times a day. This may be repeated until relief is obtained.

There is no topic upon which the profession is so justly chargeable with uncertainty and palpable error, as it is with reference to the treatment of diseases attributed to worms in the alimentary canal, by remedies denominated anthelmintics, to which the specific property of destroying worms is ascribed. It is well known that the existence of living worms in the stomach and bowels is often found to be consistent with otherwise sound health, and that they often spontaneously escape from the body *per os* and *per anum* when no previous evidence of their existence has been discernible, and when no other disturbance of health can be detected. This is often observed in school-boys who partake freely of unripe fruit; and these worms are of the variety under consideration, and they are often found in the bowels of persons who have been killed when in high health. Still, however, this same kind of worm is found in children and persons of bad general health, and sometimes accumulating in such numbers as to become a source of disease, and require remedies for their destruction and removal. In most cases, however, even of this character, the worms are often the *effect* of preëxisting disease, and by no means its primary *cause*, notwithstanding their presence may now be the only apparent source of mischief. Especially will it be found in children, that their digestive organs have been impaired for a long time, and their health frail and feeble, before any suspicion of worms could be gathered from the symptoms. And in a multitude of examples, anthelmintics, supposed to be specific in their action, are given for weeks and months, when there is not only no proof of the existence of worms, but when the ultimate history of the

patient proves that he has only suffered from the suspicion of being troubled with worms, while his malady has been all the while of another and a different character. This discovery is, however, very often delayed until all the articles of this class, and many more, have been tried in vain, and until mothers, nurses, doctors, and quacks have drugged the patient to surfeiting with worm nostrums and vermifuges of every variety.

It has been judiciously stated, in the preceding paragraph, that the action of all anthelmintics is "merely *temporary*," even when they act at all. This is true so far as the worms are concerned, when there happens to be any in the case; but the patient who has taken "an ounce of garlic swallowed whole," or an equal quantity of "tin filings," and followed these with a drachm of cowhage or a draught of "two ounces of spirits of turpentine," will be slow to confess that their action upon his stomach and bowels has been "merely temporary," and is often condemned to find the results disastrously permanent; even when taking these worm medicines has only proved, as it often does, to the satisfaction of the physician, that there are no worms in the case, and that anthelmintics are uncalled for.

The truth is, that no certain diagnosis of worms, other than their appearance in the discharges, is worthy of confidence, and hence, without this ocular proof, the use of anthelmintics is of equivocal propriety. And even where the symptoms of intestinal irritation lead to the suspicion of worms, to "restore the healthy action of the digestive organs" and correct the morbid state which "promotes the generation of intestinal worms," these are the true indications. It need scarcely be said that the medicines arranged under this class are not those best adapted to this purpose, but are correctly pointed out in the last sentence of the preceding paragraph.

It is only when the presence of worms is definitely ascertained, that any of the specific anthelmintics, as they are here called, are at all adapted to the case, and then only for merely "temporary" purposes, and quickly followed by cathartics, unless they possess this property in common with their specific virtue. The turpentine will be found to be the most successful of any, especially in tape-worm and in ascarides, in which latter case it should be used as an enema, as this species only infest the rectum.

White, in his *Natural History of Selborne*, speaking of the effects of earth-worms on the soil in promoting vegetation, says, "The most insignificant insects and reptiles are of much more consequence, and have much more influence in the economy of nature, than the incurious are aware of; and are mighty in their effect from their minuteness, which renders them less an object of attention, and from their numbers and fecundity. Earth-worms, though in appearance a small and despicable link in the chain of nature, yet, if lost, would make a lamentable chasm. For, to say nothing of half the birds, and some quadrupeds, which are entirely supported by them, worms seem to be equal promoters of vegetation, which would proceed but lamely without them, by boring, perforating, and loosening the soil, and rendering it pervious to the rain and the fibres of plants, by drawing straws and stalks of leaves and twigs into it; and most of all, by throwing up such infinite numbers of lumps of earth, called *worm-casts*, which, being their excrement, is a fine manure for grain and grass. Worms probably provide new soil for hills and slopes, where the rain washes the earth away, and they affect slopes probably to avoid being flooded. Gardeners and farmers express their detestation of worms; the former because they render their walks unsightly, and make them much work, and the latter because, as they think, worms eat their green corn. But they would find that the earth without worms would soon become cold, hard-bound, and void of fermentation, and consequently sterile; and besides, in favor of worms it should be hinted, that green corn, plants, and flowers are not so much injured by them as by many species of *Coleoptera* (*scarabs*) and *Tipulæ* (*long-legs*) in their larvæ or grub state, and by unnoticed myriads of small shelless snails called slugs, which silently and imperceptibly make amazing havoc in the field and garden. Worms work most in the spring, and are out every mild night in the winter. They are very prolific.

Worms are readily destroyed by the application of common salt, sown broadcast, at the rate of five or six bushels per acre; or on grass plats, by the application of lime-water, or rather milk of lime, which is readily made by stirring for ten minutes a pound of hot lime in four or five pailfuls of water. But, for the reasons already given, they should not be destroyed.

Lith of E. C. Kellogg. Hartford, Conn.

No. 24

CROTALUS HORRIDUS.

Rattle-Snake

VERTEBRATA.

Vertebrated Animals.

No. 24.

CROTALUS HORRIDUS.

THE RATTLESNAKE.

The animal substance. *Lachesis.* A medicinal agent.

Geog. Position. United States, Guiana.
Quality. Infectious, malignant.
Power. Alterative.
Use. Sufferings of drunkards, from the abuse of mercury, fainting-fits, erysipelas, hydrophobia, &c.

SCIENTIFIC ANALYSIS.

Natural Classification.

1. Division *Vertebrata.* Class *Reptilia.*

Dr. Barton, Memoirs, &c., 1796. Owen, Zoöl. Trans., Vol. I. Annales des Sc. Nat., Tom. XXVI., par M. Duvernay, M. D. Jones, An. King. 558. Wyatt, Nat. Hist. 84. British Journal of Homœopathy, Jan. 1853.

The Essential Characters.

Body extremely elongated, entirely without limbs, moving itself by means of the folds it makes while in contact with the ground.

Vertebral column very movable, composed of a vast number of vertebræ supporting themselves; a great number of ribs employed in respiration. No *sternum*, nor movable *eyelids*, nor *tympanum.*

Tongue very extensible, terminated by two long, movable points, of a consistence nearly like horns, and contained, while at rest, in a membranous case; the *mouth* furnished with teeth fit only to retain the prey.

Heart with two *auricles* and only one *ventricle;* only one *lung*, extending far towards the posterior portion of the body.

Voice, when any, consisting in a dull hiss.

Method of reproduction by *eggs*, agglutinated in the form of a chaplet, and quite soft, although enveloped in a calcareous substance.

The Secondary Characters.

Crotalus. No *sternum* nor vestige of shoulder. No third *eyelid* nor *tympanum*. *Jaw* so arranged as to permit a wide opening of the mouth; the two branches are not soldered, and can separate laterally; the tympanal bone, to which they are attached, is itself suspended to another bone articulated to the cranium; the two upper maxillary bones preserve also their mobility; besides the teeth of the jaws, there is a double range in the palatine arches.

The Specific Characters.

Crotalus horridus. A *gland* placed under the eye secretes a poison, and discharges it by a canal, whose extremity opens into a duct or gutter channelled in certain teeth of the upper jaw called *movable fangs*. The animal at will can conceal them in a fold of the gum; besides these, there are in the upper jaw two ranges of palatine teeth. *Rattles* at the extremity of the tail, as many as seven or eight, rarely ten. A small rounded pit behind each nostril.

NATURAL HISTORY.

The Rattlesnake, *Crotalus horridus*, is one of the most deadly of poisonous serpents. It is sometimes found as thick as a man's leg, and six feet in length, but more usually from four to five feet long. Till the discovery of the Western hemisphere, the knowledge of these serpents was concealed from the rest of the world, and naturalists then first beheld with amazement a reptile of the most fatal nature, furnished, as if by a peculiar institution of Providence, with an instrument capable in general of warning mankind of their danger in too near an approach. There are several species, two of which are well distinguished, viz. the *Crotalus horridus* (or banded rattlesnake) of the United States, and the *Crotalus durissus* of Guiana. The former is of a yellowish-brown color, marked throughout its whole length with several transverse and somewhat irregular *fasciæ* of deep brown, and from the head to some distance down the neck run two or three longitudinal stripes of the same color; the head is large, flat, and covered with small scales, the rest of the upper parts with moderately large oval ones, all furnished with a prominent line down the middle; the under parts are of a dingy yellowish-brown color, marked here and there with numerous dusky variegations

and freckles. At the extremity of the tail is situated the *rattle*, consisting of several hard, dry, bony processes. It consists, in fact, of a number of hollow, hard, dry, and semi-transparent bones, nearly of the same size and figure, resembling in some degree the shape of the human *os sacrum*, for although only the last or terminal one seems to have a rigid epiphysis joined to it, yet have every one of them the like ; so that the tip of every uppermost bone runs within two of the bones below it; by which they have not only a movable coherence, but also make a more multiplied sound, each bone hitting against two others at the same time. The rattle is placed with the broad part perpendicular to the body, and not horizontal, and the first joint is fastened to the last vertebra of the tail by means of a thick muscle under it, as well as by the membranes which unite it to the skin ; all the remaining bones are so many extraneous bodies, as it were, or perfectly unconnected to the tail by any other means than their curious insertion into each other. These bony rings increase in number with the age of the animal, and it is said that it acquires an additional one at each casting of the skin.

The habits of the rattlesnake are sluggish ; they move slowly, and only bite when provoked, or for the purpose of killing their prey. They have two kinds of teeth, viz. the smaller, which are seated in each jaw, and serve to catch and retain their food ; and, secondly, the fangs or poisonous teeth, which kill the prey, and are placed *without* the upper jaw. These fangs constitute perhaps the most terrible weapons of attack met with in the animal creation. The poison-teeth are two in number, one fixed to each superior maxillary bone ; when not in use, they are laid flat upon the roof of the mouth, and covered by a kind of sheath formed by the mucous membrane of the palate ; but when the animal is irritated, or about to strike its prey, they are plucked up from their concealment by muscles inserted into the upper maxillary bone, and stand out like two long lancets attached to the upper jaw. Each fang is traversed by a canal, not, as it is generally described, excavated in the substance of the tooth, but formed by bending, as it were, the tooth upon itself, so as to inclose a narrow channel, through which the poison flows. The canal so formed opens towards the base of the tooth by a large triangular orifice, but at the opposite extremity it terminates near the point of the fang by a narrow longitudinal fissure.

The gland wherein the poison is elaborated occupies the greater part of the temporal fossa, and is inclosed in a white and tendinous capsule; the substance of the organ is spongy, and composed of cells communicating with its excretory duct, by which the venom is conveyed to the opening at the base of the fang. The poison-gland is covered by a strong process of the temporal muscle, which is attached to a thin aponeurotic line. The greater portion of the fibres of this muscle take their origin from the capsule of the secreting apparatus, which they partially envelop, and then, winding round all the posterior part of the gland, and passing behind the commissure of the lips, the lower part of the muscle is firmly implanted into the lower jaw very far anterior to the angle of the mouth. The process of the temporal muscle which thus surrounds the gland is very thick and strong, so that it is easy to imagine with what force the poison will by this mechanism be injected into the wounds inflicted by the fangs, seeing that the same muscles which close the jaw at the same time compress the bag of venom with proportionate energy.

M. Duvernoy, who has devoted much time to the study of the organization of venomous serpents, has ascertained, that, besides the venomous teeth in front, the existence of which has long been known, they have, in the hinder part of the jaw, longer and stronger teeth, of as great malignity. He is also inclined to the opinion, that the secretions of the lachrymal glands, in some descriptions of venomous serpents, do not go to moisten the eyeballs, but enter the mouth, and assist in communicating saliva to the food.

Behind the large poison-fang in use, the capsule that incloses it generally contains the germs of several others, ready to supply its place should the former be broken off; and in the event of such an accident, one of these supplementary teeth soon becomes consolidated with the superior maxilla, and adapted in all respects to take upon itself the terrible office of its predecessor.

Dreadful as are the means of offence thus conferred upon the poisonous serpents, it is impossible to avoid noticing in this place that admirable provision of Nature, which, in one genus at least, serves to give timely warning of the vicinity of such dangerous assailants. It is only necessary to mention the rattle of the animal under consideration; an organ

the intention of which is so obvious, that the most obtuse cannot contemplate it without at once appreciating the beauty of the contrivance. This singular rattle is formed of numerous horny rings, that are in fact merely modifications of the general scaly covering of the reptile, so loosely articulated together that the slightest movement of their formidable possessor is betrayed by the startling noise produced by the collision of the different pieces composing the organ; even when at rest, the creature announces, by rapid vibrations of the tail, the place of its concealment, apparently to caution the inadvertent intruder against too near an approach.

These animals feed principally upon birds, squirrels, and other small animals, which it is believed they have the power of fascinating. Whatever may be the nature of this power, it is certain that its effects on the little animals are irresistible. When the piercing eye of the rattlesnake is fixed on them, terror and amazement render them incapable of escaping; and while involuntarily keeping their eyes fixed on those of the reptile, birds have been seen to drop into its mouth, as if paralyzed, squirrels descend from their trees, and leverets run into the jaws of the expecting devourer. Dr. Barton of Philadelphia published in 1796 a "Memoir concerning the Fascinating Faculty which has been ascribed to the Rattlesnake and other American Serpents," in which he maintains that this supposed power of fascination does not exist, and offers some ingenious explanations of the origin of what he considers a popular mistake.

"In conducting my inquiries into this curious subject," says Dr. Barton, "I endeavored to ascertain the two following points, viz. first, What species of birds are most frequently observed to be enchanted by the serpents? and secondly, At what season of the year has any particular species been the most commonly under this wonderful influence? I supposed this would furnish me with a clew to a right explanation of the whole mystery.

"Birds have an almost uniform and determinate method of building their nests, whether we consider the form of the nest, its materials, or the place in which it is fixed. Those birds which build their nests upon the ground, on the lower branches of trees, and on low bushes, (especially on the sides of rivers, creeks, &c., that are frequented by different kinds of

serpents,) have most frequently been observed to be under the enchanting faculty of the rattlesnake, &c. Indeed, the bewitching spirit of these serpents seems to be almost entirely limited to these kinds of birds. Hence we so frequently hear tales of the fascination of our cat-bird, which builds its nest in the low bushes on the sides of ereeks and other waters, the most usual haunts of the black snake and other serpents. Hence, too, upon the opening the stomachs of some of our serpents, if we often find that they contain birds, it is almost entirely those birds which build in the manner I have just mentioned.

"The rattlesnake seldom if ever climbs up a tree. He is frequently, however, found about their roots, espeeially in wet situations. It is said that it is often seen curled round a tree, darting terrible glances at a squirrel, which after some time is so much influenced by these glanees, or by some subtle emanation from the body of the serpent, that the poor animal falls into the jaws of its enemy. Is the animal's fear and distress a matter of any wonder? Nature has taught different animals what animals are their enemies; and as the rattlesnake occasionally devours birds and squirrels, to these animals he must neeessarily be an object of fear. Sometimes the squirrel drives away the serpent, but occasionally, approaehing too near the enemy, he is bitten or immediately devoured. These hostilities, however, are not common.

"In almost every instance, I have found that the supposed fascinating faculty of the serpent was exerted upon the birds at the partieular season of their laying their eggs, or of their hatching or their rearing their young, still tender and defenceless. I now began to suspeet that the cries and fears of birds supposed to be fascinated originated in an endeavor to proteet their nest and young. My inquiries have eonvineed me that this is the case.

"I have already observed that the rattlesnake does not elimb up trees; but the black snake and some other speeies of the Coluber do. When impelled by hunger, and ineapable of satisfying it by the capture of animals on the ground, they begin to climb up trees or bushes upon which a bird has its nest. The bird is not ignorant of the serpent's object. She leaves her nest, whether it eontains eggs or young ones, and endeavors to oppose the reptile's progress. In doing this she is actuated by the strength of her instinetive attaehment to

her eggs, or affection to her young. Her cry is melancholy, her motions tremulous. She exposes herself to the most imminent danger. Sometimes she approaches so near the reptile that he seizes her as his prey. But this is far from being universally the case. Often she compels the serpent to leave the tree, and then returns to her nest.

" It is a well-known fact, that, among some species of birds, the female at a certain period is accustomed to compel the young ones to leave the nest; that is, when the young have acquired so much strength that they are no longer entitled to *all* her care. But they still claim some of her care. Their flights are awkward, and soon broken by fatigue; they fall to the ground, when they are frequently exposed to the attacks of the serpent, which attempts to devour them. In this situation of affairs, the mother will place herself upon a branch of a tree or bush in the vicinity of the serpent. She will dart upon the serpent, in order to prevent the destruction of her young; but fear, the instinct of self-preservation, will compel her to retire. She leaves the serpent, however, but for a short time, and then returns again. Oftentimes she prevents the destruction of her young, attacking the snake with her wings, her beak, or her claws. Should the reptile succeed in capturing the young, the mother is exposed to less danger. For while engaged in swallowing them, he has neither inclination nor power to seize upon the old one. But the appetite of the serpent tribe is great; the capacity of their stomachs is not less so. The danger of the mother is at hand when the young are devoured; the snake seizes upon her, and this is the catastrophe which crowns the tale of fascination.

" Some years since, Mr. Rittenhouse, an accurate observer, was induced to suppose, from the peculiar melancholy cry of a red-winged maize-thief, that a snake was at no great distance from it, and that the bird was in distress. He threw a stone at the place from which the cry proceeded, which had the effect of driving the bird away. The poor animal, however, immediately returned to the same spot. Mr. Rittenhouse now went to the place where the bird alighted, and to his great astonishment he found it perched upon the back of a large black snake, which it was pecking with its beak. At this very time the serpent was in the act of swallowing a young bird, and from the enlarged size of the reptile's belly, it was evident that it had already swallowed two or three other

young birds. After the snake was killed, the old bird flew away. Mr. Rittenhouse says that the cry and actions of this bird had been precisely similar to those of a bird which is said to be under the influence of a serpent. The maize-thief builds its nest in low bushes, the bottoms of which are the usual haunts of the black snake. The reptile found no difficulty in gliding up to the nest, from which, most probably, in the absence of the mother, it had taken the young ones; or it had seized the young ones after they had been forced from the nest by the mother. In either case, the mother had come to prevent them from being devoured."

This tribe of animals love to reside in woods, and on lofty hills, especially where the strata is rocky or chalky. Being slow of motion, they also frequent the sides of rills, where frogs, &c. resort. They are generally found during the summer in pairs, in winter collecting in multitudes and retiring under ground beyond the reach of frost. The rattlesnake is viviparous, producing its young (generally about twelve in number) in the month of June, and it is said to practise the same extraordinary mode of preserving them from danger which is attributed to the viper in Europe, viz. of receiving them into its mouth, and retaining them in its stomach till the danger is past, when they issue forth again uninjured. It is well known that in the Western States of North America, where rattlesnakes are plentiful, the hogs kill and eat them, nor is their bite formidable to their swinish enemy, on whom its venomous fangs seem to produce no effect. It is owing to this well-known fact, that families resident in those parts of the country conceive that hog's lard must be a kind of antidote to their poison, and frequently use it successfully as a remedy.

The Striped Rattlesnake, *Crotalus durissus*, may be distinguished from the preceding by the different disposition of its colors, being of a deep brown above, with pale yellow streaks forming a continued series of large rhombs or lozenges down the back, the stripes growing less distinct as they descend on the sides. The neck is marked by a longitudinal streak on each side, and the under parts of the body are of a dusky yellowish brown, with numerous small dark spots and patches. It is a native of the same parts of America as the one already described, resembling it also in size and general proportions, as well as in the fatal effects of its bite.

There is also the Wood Rattlesnake, *Crotalus dryinus*, which is of a paler color than either of those previously mentioned, and more particularly distinguished by its having a much longer rattle. The Ground Rattlesnake, *Crotalus miliarius*, is a small species, which inhabits the Southern and Western States of America. It has but two or three rattles on the tail, and is much dreaded, as its small size and the slight noise of its rattle render it more liable to be overlooked.

The remains of an extinct genus of serpents, indicating species of from ten to twenty feet in length, have been discovered in the Eocene tertiary formations in Suffolk, Kent, and Sussex, England. (See Owen's paper in the *Geological Transactions*, 2d Series, Vol. VI. p. 209.)

In antiquity the serpent played an important part. By some nations it was regarded as the emblem of cunning, deceit,' and wickedness (compare the narration of the fall of man, in Genesis, with the Persian saga of Ahriman and Ormuzd); by others, such as the Egyptians and Phœnicians, it was looked upon as a good genius (ἀγαθοδαίμων), and worshipped as the emblem of fertility; while by the Greeks and Romans, whose mythology originated undoubtedly from Egypt and the East, it appeared under a variety of symbolic representations. With the latter, the serpent was the well-known emblem of the healing art; and in the present time a serpent with its tail in its mouth is regarded as an emblem of eternity. The serpent appears also to have held a place in the Scandinavian mythology, where it was regarded as a symbol of the human passions. In the early ages of the Christian Church, a sect of the Gnostics also worshipped the serpent, whence they were called Ophites (from ὄφις, *a serpent*). See Mosheim's *Geschichte der Schlangenbrüder der ersten Kirche*.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

All medicines possessing sufficient activity to be of much value, are always poisonous in inordinate or excessive quantities; and every thing poisonous is capable of proving medicinal in suitably reduced quantities. The ancient Greeks employed the same word both for a medicine and a poison. There are as many different modes in which poisons operate, as there are different and distinct medicinal powers of any

material activity. According to the popular notion, those articles only are poisonous which are capable of producing morbid, noxious, or dangerous effects in comparatively small quantities; but there is no just foundation for such a distinction.

In the treatment of wounds inflicted by venomous snakes, and of their immediate or distant consequences, there exists yet a great deal of uncertainty and diversity of opinion. It becomes necessary, therefore, to promote further investigation on the subject, and to encourage those who may discover the best means to shorten the labor in discussing the merits of any proposed remedy. Experience, however, in this class of diseases, occurs so rarely, that most probably observations and opinions will be very slow in forthcoming.

The best remedy against the bites of venomous serpents is the application of *dry heat* AT A DISTANCE. Whatever is at hand at the moment, a red-hot iron or live coal, or even a lighted cigar, must be placed as near the wound as possible, without, however, burning the skin, or causing too sharp pain; but care must be taken to have another instrument ready in the fire, so as never to allow the heat to lose its intensity. It is essential, also, that the heat should not exercise its influence over too large a surface, but only on the wound and the parts adjacent. If oil or grease can be readily procured, it may be applied round the wound, and this operation should be repeated as often as the skin becomes dry; *soap*, or even *saliva*, may be employed where oil or grease cannot be obtained. Whatever is discharged in any way from the wound ought to be carefully removed. The application of burning heat should be continued in this manner until the patient begins to shiver and to stretch himself; if this takes place at the end of a few minutes, it will be better to keep up the action of the heat upon the wound for an hour, or until the affections produced by the venom are observed to diminish.

Internal medicines must be judiciously administered at the same time. In case of a BITE FROM A SERPENT, it will be advisable to take, from time to time, one or two gulps of salt and water, or a pinch of common salt, or of gunpowder, or else some pieces of garlic. If, notwithstanding this, bad effects manifest themselves, a small quantity of wine or brandy, administered every two or three minutes, will be the

most suitable remedy; and this should be continued until the sufferings are relieved, and repeated as often as they are renewed.

If the shooting pains are aggravated, and proceed from the wound towards the heart, and if the wound becomes bluish marbled, or swollen, with vomiting, vertigo, and fainting, the best medicine is *arsenic.* It should be administered in a dose of four globules in a teaspoonful of water; and if, after this has been taken, the sufferings are still aggravated, the dose should be repeated at the end of half an hour; but if, on the contrary, the state remains the same, it should not be repeated until the end of two or three hours; if there is an amelioration, a new aggravation must be waited for, and the dose ought not to be repeated before its appearance.

In cases in which arsenic exercises no influence, though repeated several times, recourse must be had to *belladonna; senna* has also been known frequently to prove efficacious.

The poison may also be sucked out. This can do no harm, unless the person who sucks the wound should have a sore on the lips, or in the mouth. It is however well, at any rate, to take a little garlic or salt in the mouth. The sucking must be strong and continuous, and the wound must be drawn well asunder. Whilst sucking, press the hand hard toward the wound over the adjoining parts, particularly from the side next the heart. Immediately after the wound has been sucked, rub into it fine salt as long as it will receive any, or gunpowder, tobacco-ashes, chewing tobacco, wood-ashes, or whatever of this kind is at hand; salt, however, is the best. At the same time, let the patient keep as quiet as possible; the more motion, or the greater the agitation, the greater will be the danger.

It is almost impossible to become familiar with cases of hydrophobia without their suggesting the possible analogy between the poison of such cases and that of snakes; and in reference to this most important possibility it may be mentioned, that, some months ago, a man bitten by a mad dog, and ill of hydrophobia, in Italy, was attempted to be cured by the bite of some venomous snake, probably the common viper; and that, according to the newspaper report (for it never appeared in any scientific journal), there was a marked improvement for some time after the bites, although the termination was ultimately fatal; but the symptoms were en-

tirely changed, so that the death was attributed to the bites of the snakes, rather than to the original wound inflicted by the dog. How far this inference was just, it is impossible to determine.

The following case, quoted by Lenz from Latreille, is more curious as illustrating the habits of the time and people where it happened, than as an example of the effects of the poison. "At the time that Dillon, in the seventeenth century, was on a visit at Cananer in Malabar, the private secretary of the prince was bitten by a snake. The wounded man was brought to town, and along with him the snake, well secured in a vessel. The prince was much distressed by the accident, made the Brahmins be sent for, who ordered the snake into their presence, and explained to it how important to the state was the life of the wounded statesman. They used both entreaties and threats. They clearly told the snake, that, if the wounded man died, he, the snake, should be burned in the same funeral pile; but the snake was inflexible, and the secretary died of the wound. The prince was sore depressed; yet he reflected, that perhaps the dead man had committed a deadly sin, and the anger of the gods had overtaken him. Upon which he had the vessel containing the snake carried out of the house and the reptile set free, and with much fervor and many profound obeisances apologized to it for what he had done. See Acts xxviii. 3, 4."

For the following experiments, made by inserting the poison into a wound, we are indebted to Dr. Stokes of Stroud, to whom all must feel under obligation for having exposed himself to what might have been, for all that he knew, very serious danger. The result proves that a considerable quantity may be thus inserted without producing decided symptoms; and it is hoped the courageous example set by Dr. Stokes will find many imitators, and that before long such a body of evidence may be produced as to turn this powerful agent to a useful account.

"*First Experiment.*

"Nov. 7, 1852. A. S., stout, robust male, thirty-seven years of age, brown hair and eyes; temperament bilio-sanguine and lymphatic; has undergone an antipsoric treatment of two and a half years.

Received a drop of the poison, and as it was mingled

with a scruple at least of fine sac lac, made a paste of this with about a dozen drops of filtered rain-water, and introduced on a clean vaccine point some of the poison thus prepared into three punctures made by a lancet on the front of the left fore-arm; also rubbed some minute portions of the sac lac, hardened by the poison, into one of the wounds: this was done at 9.30 A. M.

Indefinable sensation of all-overishness (*sorte d'envahissement*), with a lightness in the head (*entreprise générale*), slight, lasting perhaps half an hour.

11.15 A. M. Slight aching in fourth and little finger of right hand, followed in a quarter of an hour by peculiar sensation as of thumbing (*fouillement*) in the middle of triceps, left arm.

12.30. Again inoculated the fore-arm, and made a new wound in upper arm (left).

Fine tingling in legs and feet while standing.

Slight aching in the back part of thighs: afternoon.

Tired feel in the cervical and dorsal vertebræ, with the peculiar burning often attendant on exhaustion, all day.

Kind of burning pressure on a point at back of pharynx several hours this afternoon.

Pressing and drawing sensations on points in lower limbs and feet several times.

Nov. 8. 2d day. Hard pressure on chest just above right nipple, afternoon.

3d day. Rheumatic drawing in left shoulder, morning. 10 A. M. Inoculated thoroughly well a puncture in left upper arm with the poison paste and felt immediately:

The same all-overishness as on Sunday, lasting half an hour.

Dull shoots up occiput.

Very fine prickling in left eyebrow.

Is affected easily by a very little wine or alcoholic drink during the week.

Sleep broken and disturbed, — during the week.

" *Second Experiment.*

" Nov. 8, 1852. 1st day. Rosa, tall, robust, of full form, sanguine temperament, aged nineteen, menses normal.

This morning, inoculated in the right upper arm.

Complained of great aching all up the arm to the shoulder, all day.

Frontal headache, present in the morning, disappeared after inoculation.

Temper quicker than usual.

Face flushed in the evening, and burning hot.

2d day. Throat dry on waking.

Face red on rising, and covered with hard knots as in erysipelas; this disappeared after washing.

Appeared at breakfast with the point of the nose decorated with small papules on a slightly inflamed base; nose sore in consequence.

5th day. Cutting pains in nape of neck.

Temper good, very excitable and playful, oftener than common.

6th day. Pimples going away from nose.

No more symptoms."

From the Water-Cure Journal, August, 1853.

BITE OF THE RATTLESNAKE.

The following communication, which contains some interesting statements, has been sent us for publication: —

"Jacob Price's Saw-mill,
17 miles N. W. of Stroudsburg, Monroe Co., Pa.

"Jacob Price, a hunter and lumberman, says, when he was about eight or nine years of age, some thirty-eight or thirty-nine years ago, in the month of May, he and some other boys were rolling stones down a hill, and he was bitten by a rattlesnake of the yellow kind, which they afterwards killed. The bite was in the left arm, through a flannel shirt and linsey roundabout lined with linsey. It made a scratch like a brier-scratch.

"In two or three hours it swelled up so he could not close his fingers.

"It happened half a mile from home. He was carried to his father's house, and they applied herbs and various remedies; among others they used a poultice of snake-root, and he drank new milk, and they applied salt and indigo. This was done for two or three days, when the arm became black up to the shoulder, and his body swollen down over his heart, and the black streaks were extending down over his body;

and during the last day those remedies were used he knew nothing, and they gave him up to die.

"His father concluded to try how it would operate to cut the wound open and apply cold water. He cut the wound open three fourths of an inch in depth, and one cut above also, and poured cold water on it from a coffee-pot.

"In about two hours consciousness returned, and in three or four days he was running about again, entirely recovered.

"Isaac Gruber, at Paradise (a few miles above), was bitten about twenty-two years ago in the leg, just above the ankle.

"They bound his thigh very tight, and doctored him with all the remedies they knew for four or five days. The limb swelled up "as large as a barrel," and burst open in forty or fifty places in a kind of blisters, from which the yellow water was running. He fainted about every half-hour. At length, hearing of J. Price's father, they sent for him. He arrived about noon. He cut the limb open in more than fifty places, half an inch deep, and poured on cold spring-water, and before night the fainting ceased, and the man was soon entirely restored.

"The same man was bitten once afterwards, and cured in the same way by J. Price's father.

"The little son of Wm. Bodhead, who keeps the hotel at the Delaware Water Gap, was bitten by a pilot snake and was very ill; and they had the doctors and applied their usual remedies for two or three days, but without success. They then sent for his father, who, on account of the boy being quite young, and the case a bad one, feared to make the incisions at first, but at length did so, and the boy is now well. Thinks this was seven or eight years ago.

"Jacob Price further says, and I give his own words, as I have done very nearly in the preceding statements: —

"'George Sears was bitten in the big toe about seven years ago, and I was there, happening to be passing with my team. The swelling was passing up his leg, and was about half way to his knee when I arrived, being an inch thicker at the swollen part, and advancing up the leg in the form of a ring.

"'I cut the toe open and applied water, pouring it on from a height out of a coffee-pot. The swelling stopped its

progress up the leg at once, and the next day the man was well and at work.'

"The above are the *worst* cases I can remember. I have known many others which were not so bad, and all cured by the application of cold water. Among the lumberers and others in this and the neighboring counties, it is the common remedy, and being entirely successful with it, they use no other, at least in our neighborhood. If a dog or a cow is bit, and they can get the animal to a stream, they are made to stand in it, and are certain to be cured. I heard, when in Monroe County in 1849, of a cow being found with her neck swollen, as the narrator said, so as to be 'nearly as large as her body.' She was made to stand in a stream, and recovered.

"I give the above, hoping that, if published, it may be of use to some.

"Samuel E. Griscom."

GLOSSARY.

A.

Abbreviate. Disproportionately short in a part.

Abdomen. In *vertebrated animals*, the lower belly, or that part of the body which lies between the thorax and the bottom of the pelvis. In the *invertebrated animals*, the lower part of the body, united to the thorax.

Abdominal. Pertaining to the abdomen.

Aberrant. Wandering, or deviating from; a term applied to those species which deviate most from the type of their natural group.

Abnormal; Abnormous. Irregular, deformed.

Abranchiate. Devoid of gills.

Acanthocephalous. Pertaining to an order of intestinal worms, which have the head armed with spines or hooks.

Accessory. Additional; subordinate to the principal.

Acclivous. Inclining by a gentle ascent.

Acephalous. Having no apparent head: a term to denote, those animals in which a distinct head is never developed.

Acerous. A term applied to insects that have no antennæ.

Acetabula. The fleshy sucking-cups with which many of the invertebrate animals are provided.

Achatine. Marked with various concentric, curved, or parallel lines, resembling the veining of an agate.

Aciculæ. Small spikes, spines, or prickles with which many animals are armed; as the hedgehog, several of the Crustacea, &c.

Acinaciate. Falchion-shaped. Curved, with the apex truncate, and growing gradually wider towards the end.

Acinaciform. Whose horizontal sections are acute-angled triangles gradually increasing in diameter from the base to the apex, and propagated in a curved line.

Acini. The secreting parts of glands, when they are suspended like small berries to a slender stem.

Aciniform. Being in clusters like grapes.

Acuducted. Scratched across very finely, as if with the point of a needle or pin.

Aculeated. Furnished with prickles, as the body of a hedgehog; or ending in a sting, as the abdomen of a female wasp or bee.

Aculeiform. A term applied to the ovipositors of Hymenopterous insects.

Acuminate; Acuminated. Terminating gradually in a sharp point.

Acute. Terminating in an acute angle.

Adductor (Muscle). A muscle which draws one part of the body towards another. In *shells* that which closes the two pieces of a bivalve together.

Adeniform. Of a gland-like shape.

Adeps. Fat; a concrete oily matter contained in the cells of the adipose tissue.

Adernata. A term applied to the pupa of an insect when the prior skin is thrown off, and the eyes, antennæ, legs, and wings of the future perfect insect appear through the case.

Adiaphanous. Not transparent in the least degree.

Adipocire. A substance of a peculiar nature, being intermediate between

fat and wax, and bearing a close resemblance to spermaceti.

Adipose. Fatty; as the adipose or cellular membrane, containing the fat in its cells; the adipose ducts, &c.

Adnate. Adhering or growing together Applied to insects, when the under jaws adhere to the lower lip through their whole length.

Aduncous. Crooked.

Æneous. Resembling the metallic splendor of brass.

Aerial. Inhabiting or frequenting the air.

Aeriducts. Respiratory organs, often foliaceous, with which the sides of the abdomen, the tail, and sometimes the trunk of aquatic larvæ and pupæ are often furnished.

Affinity. That tendency which different species of matter have to unite and combine with certain other bodies, and the power that disposes them to continue in combination.

Agglutinated. United by some viscous fluid.

Aigrette. A pointed tuft of feathers.

Air-bladder. An organ possessed by most fishes, which gives to them the faculty of increasing or diminishing their specific gravity, and assists their powers of locomotion.

Alæ. The wings of birds or insects.

Alar. Belonging to a wing.

Alate; Alated. Winged; a term applied to the expanded lips of certain shells; and to the dilated sides of the thorax, &c. in some insects.

Albinism. The change from a dark color to perfect whiteness, which (from some accidental cause) is occasionally seen in the fur of quadrupeds and in the plumage of birds.

Albuminous. Consisting of albumen, or the substance which forms the white of an egg.

Aliform. Shaped like a wing; in form and substance like the membranous wings of insects.

Alimentary Canal. The great duct or intestine, in animal bodies, by which the aliment (food) is conveyed through the body, and the useless parts evacuated.

Aliped. A wing-footed animal, or one whose toes are connected by a membrane, and serve for wings; as the bat.

Alliaceous. Having a scent of garlic.

Altivolant. Flying high in the air.

Alula. A little wing.

Alula spuria. The bastard wing: three or five quill-like feathers, placed at a small joint rising at the middle part of the wing.

Alveolar. Containing hollow cells or sockets.

Alveolate. Deeply pitted, so as to resemble a honeycomb.

Ambient. When the prothorax (in insects) is so large as to receive the whole head.

Ambitus. The circumference or outline.

Ambulacra. The perforated series of plates in the shells of the echinus or sea-urchin.

Ambulatory. Peculiarly well formed for walking.

Ametabolic. A term applied to those insects which do not undergo any metamorphosis.

Amethystine. The purple splendor of the amethyst.

Amorpha. Insects in which the pupa is unprovided either with a mouth or the organs of locomotion, and bears no resemblance to the perfect state; instanced in *Lepidoptera* and *Diptera.*

Amorphous. Having no determinate form; devoid of regular form.

Amphipodal. Having feet adapted both for swimming and walking.

Amplected. When the head of an insect is received into a sinus of the thorax.

Ampliate. Disproportionately wide at the end.

Anadromous. A term in ichthyology, to denote such fishes as have their stated periods of going from the fresh water to the salt, and again returning; of which kind is the salmon, and many of the trout family.

Anal. Pertaining to the anus: the *anal fin* is that between the vent and the tail.

Analogue. A part or organ in one ani-

mal which has the same function in another part or organ in a different animal.

Analogous. Bearing some proportion or resemblance.

Anastomose. When the mouths of two vessels unite or blend together.

Anatiferous. Producing ducks.

Anatomy. The art of scientifically separating the different parts of an animal body, to discover their situation, structure, and economy. *Comparative anatomy* is that branch of anatomy which treats of the anatomy of other animals than man, with a view to *compare* their structure with that of human beings, and thus to illustrate the animal functions.

Androgynous. Hermaphroditical, or the combination of male and female organs in the same body.

Anenterous. Pertaining to those infusorial animalcules which have no intestinal canal.

Aneurose. Applied to the wings of insects that have no nervures besides the marginal ones.

Anguilliform. A term applied to a very large class of fishes, which are soft and lubricous, like the eel, and destitute of scales.

Anguloso-undulate. When lines, fasciæ, &c. go in a zigzag direction, or with alternate acute sinuses.

Angustate. Disproportionately narrow in part; applied to the antennæ of insects when the setigerous joint is not conspicuously larger than the preceding one, beginning with a narrow base, and growing broader.

Annelidous. Belonging or pertaining to the Annelida, a division of the class Vermes.

Annulata. Those invertebrated animals in which the covering or envelope of the body is divided by transverse folds into rings, whose teguments may be either hard or soft, the muscles being situated internally.

Annulate. When a leg, antennæ, &c. of an insect is surrounded by a narrow ring of a different color.

Annulated. Formed of, marked with, or divided into, distinct rings.

Annulose. Furnished with or composed of rings.

Anomaliped. When the middle toe of a bird is united to the exterior by three phalanges, and to the anterior by one only.

Anomalous. Deviating from a general rule or system; different from congeneric species, &c.

Anourous. Destitute of a tail.

Anserine. Pertaining to the genus *Anser*; resembling a goose.

Antennæ. Organs of touch situated near the mouths of insects, having many joints.

Antennal. Relating to the antennæ of insects.

Antenniform. Having the form of, or being shaped like, antennæ.

Anterior. The fore part; as the *anterior* limbs, opposed to the *posterior*. In *bivalve shells*, the side opposite to that on which the ligament is situated: of a *spiral univalve*, that part of the aperture which is at the greatest distance from the apex: of a *symmetrical conical univalve* (such as Patella), that part where the head of the animal lies, indicated by the interruption of the muscular impression: of *Cirripedes*, that part where the cilia protrude.

Antiperistaltic. A term applied to the vermicular contractions of a muscular tube when they follow each other in a reverse direction to the usual mode.

Antiquated. A term in conchology to denote that a shell is longitudinally furrowed, but interrupted by transverse furrows, as if it had acquired new growth at each furrow; i. e. each fresh deposit or layer of calcareous matter, forming a new margin, being replaced by its successor, no longer constitutes the margin, and is consequently *antiquated* (out of date).

Antlered. Furnished with *antlers*, or branching horns, as the head of a stag.

Antlia. The oral instrument of Lepidopterous insects, in which the ordinary *trophi* are replaced by a spiral, bipartite, tubular machine for suction, with its appendages.

Antorbital. Opposite the orbits.

Anus. The termination of the rectum.

In entomology, the last two segments of the abdomen. In conchology, a depression of the posterior side near the hinge of bivalves.

Aorta. The great artery, or trunk of the arterial system, in animal bodies. It proceeds from the left ventricle of the heart, and gives origin to all the arteries except the pulmonary.

Aortal; Aortic. Pertaining to the aorta.

Aperture. A hole, cleft, or chasm; any opening, as the mouth of a shell, from which the head of the animal protrudes.

Apex. The top or termination of any part. In conchology, the top or point of the spiral cone. The term has no regard to the natural position of a shell, but is used mathematically to express the nucleus or first-formed part: from this point the shell rapidly or slowly enlarges as it descends, and takes a spiral, arcuated, straight, oblique, convolute, or irregular course.

Aphidian. Pertaining to the *Aphis* or plant-louse.

Aphidivorous. Subsisting on the *Aphis*, or plant-louse: a term applied to the larva and imago of many insects.

Apiary. The shed, stand, or other place where bees are kept.

Apical. Belonging to the apex or pointed end of a cone-shaped body.

Apiculate. Terminating suddenly in a small, filiform, truncate apex.

Apodal. Without feet or locomotive organs: fishes are so called which have no ventral fins.

Apophysis. An excrescence.

Appendicula. A small piece sometimes appended to the upper lip of an insect.

Appendiculate. When from one of the joints of an insect there issues an accessory joint or appendage; when the appendages have one or two antenniform processes at their base.

Applicant. Applied to insects' wings when at rest they are parallel with the abdomen.

Approximate. When the teeth of insects are so arranged in the jaws that there is no intervening vacancy; or when their legs are near each other at the base.

Apterous. Wingless; applied to insects which have no wings.

Aquatic. Pertaining to water: applied to animals which live in water, as fishes; or to such as frequent it, as *aquatic* birds.

Arachnoid. Formed like a spider's web.

Arboreal; Arboreous. Belonging to trees; resorting to, or dwelling in, trees.

Arborescent. Branched, or bearing some resemblance to a tree.

Arctic. Pertaining to northern regions; as the *arctic* pole or sea.

Arcuate. Linear and bent like a bow.

Arcuated. Bent in the form of an arch.

Area. The surface between given lines or boundaries.

Areate. When the mesothorax of an insect is larger than the prothorax, and terminates towards the wings in two oblique areas, inclosed by a ridge often crowned anteriorly with little teeth.

Arenose. Sandy; having the appearance of being sprinkled with sand.

Areolar. Consisting of, or marked with, numerous small circles.

Areolate. Marked with lines which intersect each other in various directions, so as to exhibit the appearance of network; when the surface of the wings is divided into various areolets.

Areola. A small area or circle.

Areolet. An extremely small circle.

Argent. The splendor of silver; as the spots on the under sides of the wings in *Argyanis Lathonia*, &c.

Aristate. Antennæ terminated by a variously shaped flat joint, longer and usually larger than the preceding one.

Armature. Horns, spinous processes, or whatever else animals are furnished with for their defence.

Armillate. When a leg, antenna, &c. of an insect is surrounded by a broad ring of a different color.

Aromatic. Having a pungent scent of spices.

Arthrium. The fourth joint of the *tarsi* of insects.

Arthroidal. A term denoting that form of joint, or species of articulation, in which the head of one bone is received into the shallow socket of another.

Articulate Fascia. A band consisting of contiguous spots.

Articulated. Jointed: applied to animals with external jointed skeletons, or jointed limbs. The term is also applied to distinct parts of shells that are fitted or jointed into each other.

Ascending. Inclining upwards by a somewhat steep ascent.

Asper; Asperated. Rough; denoting a rough or uneven surface.

Asphyxiated. In a state of suspended animation, but life not extinct.

Assimilate. To change into a like substance.

Asterialite. Fossilized asterias or star-fish.

Atrous. Pure black of the deepest tint.

Attenuated. Of a thin and slender form; made slender, thin, or less viscid; gradually tapering to the apex; disproportionately slender in a part.

Aurate. Of a color resembling gold.

Aurelia. The chrysalis of an insect.

Aurelian. Like or pertaining to the aurelia.

Auricle. The external ear, or that part which is prominent from the head. In anatomy, the *auricles of the heart* are two muscular bags, situated at the base, which in form resemble the auricle of the ear, and cover the ventricles of the heart, like caps: they receive the blood from the veins, and communicate it to the ventricles. Also, an appendage resembling an ear.

Auricled; Auriculated. Having ear-like appendages. These terms are used in describing certain *bivalves* which have a flat, angulated projection or process on one or both sides of the umbones or bosses.

Auriculars. The feathers which cover the ears of birds.

Auriculate. Expanding on each side into two processes resembling ears.

Auriform. Ear-shaped

Austral. Lying or being in or inhabiting the south; as, they dwell in *austral* lands.

Automatic. Possessed of the power of motion independent of the will

Aviary. An inclosure for keeping birds confined.

Axillar. Belonging to the *axilla* (the arm-pit): the term is also applied to other parts of the body forming a similar angle.

Axis. In conchology, the imaginary line round which the whorls of a spiral shell revolve.

Azure. A pale but clear and brilliant blue color.

B.

Baccivorous. Feeding or subsisting on berries.

Barbate. When any part is clothed with longer hairs, resembling a beard.

Barbed. Furnished with *cirri* or with filaments resembling a beard; armed with jagged hooks or dart-like points.

Barbules. Filamentous appendages, or barbs, attached to the mouths of certain fishes.

Basal. Pertaining to or constituting the base.

Base. The lower termination of any part.

Bat-fowling. A mode of catching birds at night, by holding a torch or lantern, and beating the bush where they roost. The birds, flying to the light, are then generally caught with nets.

Batrachian. Pertaining to frogs: an epithet designating an order of reptiles which includes frogs, toads, and other allied animals.

Bay. Of a bright red brown, inclining to a chestnut color.

Bee-bread. The pollen of flowers collected by bees as food for their young.

Beetle-browed. Having prominent brows.

Belting. When the eyes of an insect nearly meet both above and below the head, so as to form a kind of belt round it.

Biarticulate. Composed of two articulations or joints: applied to the antennæ and the abdomen of insects.

Biangulated. Having two corners, or angles.

Bicaudate. Having two tails.

Bicarinated. Having two elevated or sharp ridges.

Bicipital; Bicipitous. Having two heads Applied to the muscles, it signifies

having two heads or origins; and any such muscle is denominated *biceps*.

Bicolligate. In ornithology, the connection of all the anterior toes by a basal web

Bicornate; Bicornous. Having two horns.

Bicuspid. Having two points.

Bidental. Having only two teeth.

Bidigitate. Having two fingers or finger-like appendages.

Bifarious Parting in opposite directions.

Bifid. Divided by having a deep notch down the centre, opening with a cleft.

Biform. Having two forms, bodies, or shapes.

Bifurcated. Divided into two prongs or forks. In entomology, denoting that the antennæ are composed of three joints, of which the apical one is bent double, and attached to the second joint by its centre.

Bilabiate. Furnished with two lips.

Bilateral. Having two symmetrical sides.

Biliary. Belonging to or conveying the bile; as a *biliary* duct.

Bilobed; Bilobate. Divided into two lobes.

Bilocular. Divided into or containing two cells.

Bimarginate. Furnished with a double margin; as the lip of certain shells.

Biocellate. When the wing of an insect is marked with two eye-like spots.

Bipalpate. When an imperfect mouth has only labial or maxillary palpi.

Biparous. Bringing forth two at a birth.

Bipartite. Divided into two corresponding parts. Applied to the *antennæ*, it signifies that they are divided to the base into two nearly equal branches.

Bipectinate. Relating to some part which has two margins toothed like a comb.

Biped. An animal having two feet, as man.

Bipedal. Having two feet.

Bipeltate. Relating to any part having a defence like a common shield.

Bipennate. Having two wings.

Bipupillate. When an eye-like spot on the wing of a butterfly has two dots or pupils within it of a different color.

Biradiate. Having two rays; as a *biradiate* fin.

Bisect; Bisected. When the head and trunk are not separated by a suture, so that an insect consists only of two pieces.

Biserrate. When the *antennæ* are on each side serrate or toothed like a saw.

Bisexual. Partaking of the nature of both sexes.

Bisulcous. Cloven-footed; as swine or oxen.

Bituberculate. Having two knobs or tubercles.

Bivalve. A shell consisting of two parts, which open and shut; as the oyster.

Bivalve; Bivalvular. Having two valves or shells which open and shut.

Biventral. Having two bellies.

Blood. The nutritive fluid which circulates through the arteries and veins of an animal body, and which is essential to the preservation of life. All the other animal fluids are derived from the blood by secretion.

Blubber. The fat of whales and other large marine animals, of which is made train-oil. It lies immediately under the skin and over the muscular flesh.

Bombycinous. Of the color of the silk-worm; transparent, with a yellow tint.

Boom. To cry as the bittern.

Boreal. Pertaining to the north or northern regions.

Boss. In bivalve shells, the projecting point in each valve, near the hinge.

Bossed. Studded or knobbed; covered over with protuberances.

Botrylli. A little cluster of berry-shaped bodies.

Botryoidal. Having the form of a bunch of grapes.

Bovine. Pertaining to animals of the genus *Bos*, or ox.

Brachial. Belonging to the arm.

Brachiopodal. Relating to the *Brachiopoda*, a class of acephalous Mollusca, with two long spiral fleshy arms continued from the side of the mouth.

Brachypterous. Short-winged.

Brachyurous. A term applied to the short-tailed Crustacea.

Brackish. Salt in a moderate degree; as *brackish* water.

Branchilæ. The respiratory organs which extract the oxygen from air contained in water; the filamentous organs of

fishes by which they breathe in the water.

Branchial. Relating to the *branchiæ*, or respiratory organs of fishes.

Branchiopodous. Belonging or pertaining to the *Branchiopoda*, an order of Crustacea in which the feet support the gills.

Branchiostegous. Having gill-covers, as a *branchiostegous* fish; or covering the gills, as the *branchiostegous* membrane.

Breed. A race or progeny from the same parents or stock. Also, to have birth, or be produced; as, fish *breed* in rivers.

Breeding. The raising of a breed or breeds; as, the farmer attends to the *breeding* of sheep.

Breviped. A fowl having short legs, short-legged; applied to certain birds.

Brindled. Variegated with spots of different colors.

Bristle. The stiff, glossy hair of swine, especially that growing on the back.

Brocket. A red deer two years old.

Bronchial. Relating to the bronchia, or ramifications of the windpipe in the lungs.

Brow-antler. The first branch that grows on a deer's head.

Browse. To feed on the tender branches or shoots of shrubs and trees, as cattle, sheep, and goats.

Brumal. Belonging to the winter.

Buccal. Belonging to the mouth.

Buccate. When the *nasus* and anterior part of the head of an insect are inflated.

Burnished. Having the appearance of being polished or made glossy.

Burrow. A hollow place or excavation in the earth formed by various small animals for the purpose of dwelling there in security, and sometimes for depositing their provisions. To lodge in a hole excavated in the earth, as rabbits, &c.

Butyraceous. Having the qualities of, or resembling, butter.

Byssiform. In shape and appearance like the byssus.

Byssine. Made of the silky filaments hereunder described.

Byssus. The name of a long, lustrous, and silky fasiculus of filaments, by which some of the conchiferous mollusks are affixed to submarine rocks, &c.

C.

Caducous. Falling off at a certain season, as the hair of animals, &c.

Cæca. Minor stomachs, thrown off from the principal one; particularly observable in the voracious herbivorous insects, which have the anterior portion of a stomach in the form of a gizzard.

Cæcum. A blind tube, or a tube perforated at one end only.

Cæsious. Very pale blue, with a little black; the color of what are termed *blue eyes.*

Calcarate. When the tibia is armed with one or more spurs.

Calcareous. Partaking of the nature of lime.

Calcareum A spur or sharp-pointed process to the tail.

Calcaria. The stiff spines with which the *tibia* in most insects is furnished; the spurs on the legs of some of the males of Gallinaceous birds.

Calceoliform Oblong, and somewhat coarctate in the middle.

Callosity. Any hard, horny tumidity, formed in the skin of some animals (such as the dromedary, for instance), in those parts which are subject to most use. By conchologists, it is used to denote those undefined tumidities or bumps which appear in the inner surface of some bivalve shells.

Callous. Hardened; indurated; of a horny or cartilaginous substance.

Callow. Destitute of feathers; unfledged.

Callus. Any corneous or bony excrescence; an indurated knob or protuberance.

Calotte. A covering of feathers on the head of a bird, bearing a fancied resemblance in shape to the cap or coif worn in Popish countries as an ecclesiastical ornament.

Campanulate. Bell-shaped.

Canal. A grove or channel observable in different parts of spiral shells, belonging to carnivorous Mollusca, and is that part fitted for the protrusion of

the cylindrical siphon possessed by the animal.

Canaliculated. Made like a groove, canal, or furrow.

Canaliform. Having an elongate depression, channel, or furrow.

Cancellate; Cancellated. Cross-barred; marked with cross lines, or transverse lines crossing longitudinal ones at right angles. In conchology, it denotes that the surface of a shell is marked by lines which cross each other.

Cancerite. A petrified crab.

Canine. Pertaining to dogs. *Canine teeth* are two sharp-pointed teeth in each jaw of an animal, one on each side, between the incisors and molars.

Canthus. An angle of the eye; a cavity at the extremity of the eyelids; the greater is next to the nose, the lesser near the temple.

Capillary. Fine, minute; small in diameter, though long, resembling a hair; as a *capillary* vessel or tube. Applied to the antennæ of insects, nearly as slender as a hair.

Capistrate. When the anterior part of the head of an insect is attenuated and subelongated into a kind of flat rostrum or muzzle.

Capistrum A word used by Linnæus to denote the short feathers on the forehead just above the bill. In some birds these feathers fall forward over the nostrils: they quite cover those of the crow.

Capitate. Terminated in a knob; when antennæ suddenly end in a knob of one or more joints.

Capriform. Having the form of a goat.

Caput. The head, or first segment of insects

Carabidous. Belonging to the group of insects of which the genus *Carabus* is the type.

Carapace. The upper shell of a crab or other crustaceous animal. The hard covering or shell which protects the upper part of the body of the Chelonian reptiles.

Cardinal Teeth (*in shells*) Those teeth which receive their full development close to the umbones.

Carinæ. Keels; when the surface is raised into elongated lines.

Carinate; Carinated Having, as is the case with certain shells, a longitudinal prominence like the keel of a boat.

Carious. Corrupted; ulcerated, as a bone.

Carneous. Fleshy; having the qualities of flesh.

Carnification. A turning to flesh.

Carnivorous. Subsisting wholly on flesh. The *Carnivora* form a family in the order *Carnaria.* The word is also used to denote a family of coleopterous insects which pursue and devour others.

Carnose. Of a soft and fleshy substance.

Carpus. The wrist.

Cartilage. A smooth, solid, elastic substance, softer than bone, and of a homogeneous texture. Applied to shells, it denotes the ligament, a flexible, fibrous substance by which the valves are united, situated near the beak.

Cartilaginous The term applied to those fishes whose muscles are supported by cartilages instead of bones, or whose skeleton is cartilaginous.

Caruncle. The fleshy comb on the head of a fowl; a soft wart-like eminence.

Carunculated. Having a fleshy excrescence; or soft fleshy protuberance

Caseous. Having the qualities of cheese.

Casque. A helmet-shaped tuft on the head of a bird.

Castaneous. Of a rich deep brown, — the color of a horsechestnut.

Catenate. A term used when the surface between impressed lines on elytra, &c. is divided into oblong elevations, and is supposed to resemble a chain.

Catenulate. Consisting of little links or chains; having a series of elevated oblong tubercles resembling a chain.

Cauda A tail: applied to parts resembling a tail. In shells, the elongated base of the ventre, lip, and columella.

Caudal. Belonging or pertaining to the tail.

Caudate; Caudated. Having a tail; when the wings of insects terminate in a tail-like process.

Caudulæ. Tail-like appendages to in-

sects, as in cockroaches and crickets.

Cavernulous. Full of little cavities.

Cellulæ. The divisions into which the membranaceous wings of insects are divided by the nervures.

Cellular. Consisting of cells, or containing cells. The *cellular membrane*, or *cellular tissue*, in animals, is composed of an infinite number of minute cells communicating with each other, and serving as reservoirs for fat.

Celluliferous. Bearing or producing little cells.

Cementitious. Agglutinating, having the quality of cementing.

Cephalic. Belonging to the head.

Cephalo-thorax. The anterior division of the body in spiders, scorpions, &c., which consists of the head and chest united.

Cephalopodous. Belonging to the *Cephalopoda*, the class of molluscous animals in which long prehensile processes, called feet, project from the head.

Cephalophorous. Belonging to one of the three orders of the class *Cephalophora ;* the first consisting of cuttle-fisb, &c., which are destitute of shells ; the second composed of those microscopic cellular bodies which are regarded as shells by some authors; and the third containing the true chambered shells.

Cercæ. The feelers which, in some insects, project from the hind part of the body.

Cercariæ. Those insects whose body is terminated by a tail appendage.

Cercariiform. Shaped liked tbe cercariæ.

Cere. The naked skin wbich, in some birds, covers the base of the bill.

Cereal. Relating to the cere, or naked skin that covers the base of the bill in certain birds.

Cerebellum. The hinder part of the head, or the little brain.

Cerebral. Pertaining to the cerebrum, or brain.

Cerebrum. The brain.

Cerebroidæ. The knots in which the diffused brain of insects is centred.

Cereous. Partaking of the nature of wax.

Cernuous. When the head of an insect forms downwards an obtuse angle with tbe horizontal line, or trunk.

Cervical. Belonging to the neck.

Cerviculate. When the prothorax is elongate, attenuate, and distinguished from the antepectus by no suture; so as to form a distinct and unusually long neck.

Cetaceous. Pertaining to the whale kind.

Cetology. The natural history of cetaceous animals.

Chalybeous. The blue metallic splendor of the mainspring of a watch.

Chambered. A term in conchology, denoting that the cavity of a shell is not continuous, but is divided by shelly diaphragms or septa.

Chamfered. Cut into furrows, or cut sloping; as a *chamfered* shell.

Chap. The upper and lower part of the mouth in animals; the jaw.

Characteristic. That which *characterizes*, or constitutes a character.

Chatoyant (Fr.). Having a changeable, undulating lustre, like that of a cat's eye in the dark.

Cheek Pouches. The hollow recesses in the cheeks of certain rodent and quadrumanous animals, which they use as receptacles for food.

Chelæ. The bifid claws of the Crustaceæ, scorpions, &c.

Chelate. When the upper jaws are furnished at the end with a *chela* or thumb.

Chelicera. The prehensile claws of the scorpion, which are the homolognes of antennæ.

Cheliferous. When the cauda, or tail, is terminated by a very thick process somewhat resembling a lobster's claw. Furnished with claws.

Cheliform. Having the form of a claw.

Chelonian. Belonging to or having the properties of an order of reptiles which includes the tortoises and turtles.

Chilopodous. Bolonging to the *Chilopoda*, an order of many-footed insects, typified by the Centipede.

Chitine. The peculiar chemical principle which hardens the integuments of insects.

Choroid. In anatomy a term applied to

several parts of the body that resemble the *chorion*, or exterior membrane which invests the fœtus in utero; as the inner membrane investing the brain, &c.

Chyle. The nutrient fluid extracted from the digested food by the action of the bile.

Chylifactive. Forming or changing into chyle; having the power to make chyle.

Chyliferous. Transmitting chyle.

Chyme. The digested food which passes from the stomach into the intestines.

Chrysalis. The particular form which butterflies, moths, and some other insects assume, before they arrive at their winged or perfect state. It is also called *Aurelia*, from *aurum*, gold.

Cicatricose. Having elevated spots of a different color from the rest of the surface, resembling scars.

Cicatrisive. Tending to promote the formation of a scar or cicatrix.

Cicatrix; Cicatrice. A scar; a little seam or elevation of flesh remaining after a wound is healed.

Cilia. The microscopic hair-like bodies which cause, by their vibratile action, currents in the surrounding fluid, or a motion of the body to which they are attached.

Ciliary. Belonging to the eyelids.

Ciliate; Ciliated. Furnished with *cilia*, or vibratile hair-like filaments resembling the hairs of the eyelids; when the margin is fringed with a row of parallel hairs. When the tongue is fringed with fine bristles, as in ducks, it is said to be *ciliated.*

Ciliograde. Swimming by the action of cilia.

Cimicine. Having an offensive scent, like that of the bed-bug.

Cincture. An apparent band or girdle encompassing the body of an insect, bird, &c.

Cinereous. White with a shade of brown; having the color of wood-ashes.

Cingulate. When the abdomen or the trunk of an insect is wholly surrounded by one or more belts of a different color.

Circlet. A little circle, or annular mark.

Circular. Having the diameter every way equal.

Circulate. To run; to flow in veins or channels.

Circumambient. When the sides of the prothorax are elongated anteriorly and curve inwards, their ends lapping over each other and the head, so as to form a circle round the posterior part of the latter, and leave a space open for the eyes to see objects above them.

Circumfluent. Flowing round.

Circumgyrations. Motions in a circle.

Circumsepted. Wings whose margin is everywhere strengthened by a nervure.

Circumvolution. The act of flying round.

Cirrate. Terminating in a pair of curling, hairy branches resembling tendrils.

Cirri. Curled filamentary appendages; as the feet of the barnacles.

Cirrigerous. Supporting cirri.

Cirrigrade. Moving by means of cirri.

Cirrose. Having one or more cirri.

Cirrus. A lock of curling hair.

Citrine. Of a lemon-color; a greenish-yellow.

Class. A primary division of the animal kingdom.

Classification. The act of forming into classes or sets.

Classified. Arranged in classes.

Clathrate. Having several elevated lines which cross each other at right angles.

Clathrose. When striæ or furrows cross each other at right angles.

Clavate. Club-shaped: linear at the base, but towards the base growing gradually broader.

Claviform. Whose vertical section is cuneate, and horizontal circular.

Cleft. Cut into equal and deep segments, but not reaching the base.

Climatic. Pertaining to, or limited by, a climate.

Cloaca. The cavity common to the termination of the intestinal, urinary, and generative tubes.

Cloven-footed. Having the foot or hoof divided into two parts, as the ox; bisulcous.

Clypeiform. Shield-shaped; applied to the large prothorax in beetles.

Clypeate. When the prothorax quite covers and overshadows the head; or

when a concavo-convex plate is affixed to the outside of the cubit.

Coalite. When parts usually separate are distinguished neither by incisure, segment, nor suture.

Coarctate. Enveloped closely by a case, as the pupa of an insect which gives no indication of the parts it covers.

Cochlite. A fossil shell having a mouth like that of a snail.

Cocoon. An oblong ball or base in which certain insects involve themselves and pass their pupa state of existence; as, the silk-worm involves itself in a *cocoon*, by forming threads of which its silk is afterwards composed.

Cochleated. Spiral, resembling a turbinated shell.

Coleopterous. Belonging to the *Coleoptera*, an order of insects in which the first pair of wings serves as a sheath to defend the second pair.

Collapse. To close, by falling together.

Collateral. Descending from the same stock or ancestor.

Colliform. When the prothorax is short and narrow, and not so conspicuous as the other pieces of the trunk.

Colligate. Adhering, or so fixed to any part as to have no separate motion of its own.

Collum (*the neck*). In entomology, the constricted posterior part of a pedunculate head, by which it inosculates in the trunk.

Colon. In anatomy, the largest division of the intestinal canal.

Colubrine. Relating to serpents.

Columella. The central column, taking its rise from the basal centre.

Columellar. Pertaining to or resembling a columella.

Columnar. Formed like the shaft of a column; the vertical section cuneate, the circular horizontal.

Comate. The surface thickly covered by very long flexible hairs.

Commigrate. To migrate together, or in a body, from one country to another.

Commissure. Articulation; a joint, seam, or closure; a suture in the cranium or skull. Also, certain parts in the ventricles of the brain, uniting the two hemispheres.

Comparative Anatomy. See *Anatomy*.

Complanate. A convex or irregular surface having a plain, light depression.

Component. Forming a compound; as the *component* parts of a fossil substance, &c.

Compositus (*ventriculus*). The upper part of a stomach of an insect, having a long, pear-shaped cell for the reception of blood sucked from animals.

Complicant. When the elytra lie a little over each other.

Compound Eyes. Those eyes of insects which consist of an aggregate of hexagonal lenses.

Compressed. Flatted at the sides vertically.

Concamerated. Arched over; vaulted.

Concave. Hollow, and arched, or rounded, as the inner surface of a spherical body.

Concavo-concave. Concave or hollow on both surfaces.

Concavo-convex. Concave on one side and hollow on the other.

Concentric. Having a common centre. Surrounding a centre; applied to the direction taken by the lines of growth in spiral and other shells.

Conchæ. Shells consisting of two or more pieces or valves, bivalves or multivalves.

Conchifer. A bivalve shell with unequal valves.

Conchiferous. Pertaining to the *Conchiferæ,* a class of invertebrated animals, or Mollusca inhabiting bivalve shells. Producing or having shells.

Conchiform. When the base-covers of an insect are a semicircular concavo-convex scale, something resembling the valve of a bivalve shell.

Conchite. A fossil or petrified conch or shell.

Conchoidal. Resembling a conch or marine shell; having convex elevations and concave depressions, like shells.

Conchological. Pertaining to conchology.

Conchology. The science which treats of shells and their included animals.

Conchylaceous. Pertaining to or resembling a shell; as *conchylaceous* impressions

Concolorate. Of the same color with another part.

Concretion. The act of growing together, or of uniting, by other natural process, the small particles of matter into a mass. A solid substance formed in the soft parts or in the cavities of animal bodies.

Condensative. Having a power or tendency to condense.

Condyloid. The projecting soft end or process of a bone.

Configure. To dispose in a certain form, figure, or shape.

Confluent. Flowing together; when spots, &c. run into each other.

Conformation. The particular structure of a body, or disposition of the parts which compose it.

Congeneric. Being of the same kind or nature.

Congeners. Animals of the same kind or nature.

Congenial. Partaking of the same genus, kind, or nature; agreeable to the nature.

Congenital. Of the same birth; born with another.

Congeries. A collection of several particles or bodies in one mass or aggregate.

Conglobate. Formed or gathered into a ball.

Conirostral. Having the beak shaped like a cone.

Connate. When parts that are usually separated are, as it were, soldered together, though distinguished by a suture.

Connatural. Participating of the same nature; connected by nature.

Connecting Nervures. Nervures that, running transversely or obliquely, connect the longitudinal ones, and so form the areolets.

Connivent. The meeting of two lines so as to form an angle. When erect wings are so closely applied to each other that the corresponding margins touch.

Conoid. In anatomy, a gland in the third ventricle of the brain, shaped like a cone or pine, and called the pineal gland.

Conoidical. Having the form of a conoid.

Consanguineous. Related by birth; descended from the same parent or ancestor.

Consecutive. Uninterrupted in course or succession.

Consperse. Thickly sprinkled with minute irregular dots often confluent.

Constrict. Suddenly and disproportionably smaller at one end.

Consute. Having very minute elevations in a series at some distance from each other, of a different color from the rest of the surface.

Conterminous. Nearly allied; as *conterminous* groups, &c.

Contorted. Twisted, or incumbent on each other in an oblique direction.

Contractile. Having the power of shortening or of drawing into smaller dimensions.

Convex. Rising or swelling on the exterior surface into a round or spherical form.

Convolute; Convoluted. Twisted spirally, or rolled regularly one over the other; when the wings of an insect so envelop the body as to give it a cylindrical form.

Convolvolent. When the anal area is horizontal, incumbent on the back of the insect, and forms a right angle with the rest of the tegmen, which is vertical and covers the sides.

Coracoid. Shaped like a crow's beak.

Corbiculate. When the tibia or shank of an insect is fringed with incurved hairs calculated for carrying kneaded pollen.

Corcula. The reservoir in the dorsal channel through which the blood of insects flows. Each corculum is somewhat pear-shaped, and has a distinct, tough, and elastic coat like that of an artery; and the anterior appears to be wholly filled with blood.

Cordate; Cordiform. Heart-shaped. Ovate or sub-ovate, and hollowed out at the base, without posterior angles.

Coriaceous. Of a tough, flexible, and leather-like consistence.

Cornea. The transparent membrane in the fore part of the eye, through which the rays of the light pass.

Corneous. Horny; of a horn color; or resembling horn.

Corneo-calcareous. A term in conchology, used to express the mixture of horny and calcareous matter which enters into the composition of some shells. It is also applied to those opercula which are horny on one side and testaceous on the other.

Cornets. The hard, scaly processes which move and rattle at the end of a rattlesnake's tail.

Cornigerous. Having horns; as, *cornigerous* animals.

Cornua. Horns, or horn-like processes.

Corolla. A little crown; a kind of wreath.

Coronal. Pertaining to the crown or top of the head.

Coronate Prolegs. Prolegs that have an entire coronet of crotchets.

Coronated. Crowned towards the apex, as some shells are, by a row of spines, tubercles, &c.

Coroniform. Having the form of a crown.

Corpus. In conchology, the body of the shell; the last or great wreath, in which the aperture is situated.

Corpuscular. Relating to *corpuscles*, or small particles supposed to be constituent materials of all large bodies, or the elementary principles of matter.

Corrugate; Corrugated. When a surface rises and falls in parallel angles more or less acute; wrinkled.

Corselet, or *Thorax.* That part of winged insects which answers to the breast of other animals.

Cortex. A thin membrane covering the skin; the epidermis.

Corticated. Resembling the bark or rind of a tree.

Corvine. Relating to the crow kind.

Costa, or *Costalis* (*cellua* or *nervura*). The cell or nervure nearest the upper margin of each wing in insects.

Costal. Pertaining to the sides of the body or the ribs; or to the *costa* in the wings of insects.

Costate. Having several broad, elevated lines.

Coverts, or *Wing-coverts.* The *lesser coverts* of the wings are the small feathers that lie in several rows on the bones of the wings; the *under coverts* are those that line the inside of the wings; and the *greater coverts* are the feathers that lie immediately over the quill-feathers and the secondaries. *Tail-coverts* are the feathers which cover the tail on the upper side, at the base.

Coxa. The first or basal joint of the legs in insects.

Cranial. Pertaining to the cranium or skull of an animal.

Cranium. The skull of an animal.

Craw. The crop, or first stomach, of fowls; an expansion of the gullet.

Crenate; Crenated. Marked with small notches, not sufficiently raised or defined to be compared to teeth.

Cremastræ. The anal hooks by which many pupæ suspend themselves.

Crenulated. Notched at the margin; having the edge cut, as it were, into very small scallops.

Crepera. A gleam of paler color upon a dark ground.

Crepitation. The act of bursting with a frequent repetition of sharp and abrupt sounds.

Crepuscular. Pertaining to the twilight; as, certain birds and insects are *crepuscular;* thereby denoting that they are seen on the wing late in the evening and before sunrise.

Crest. A tuft of feathers on the head of certain birds.

Crested. Adorned with a crest or plume.

Crestless. Without a crest.

Cretaceous. Abounding with chalk; having the quality of chalk.

Cribriform. Resembling a sieve: a term in anatomy, applied to the lamina of the ethmoid bone, through which the fibres of the olfactory nerve pass to the nose.

Crinite. Covered with long, thin hair; having the appearance of tufts of hair.

Crinoid. Belonging to the *Crinoideans*, or *Echinodermata*, fossils which resemble lilies.

Crispated. Curled, or rough with waving lines.

Cristate. Having one or two very elevated lines, usually crenate.

Crocodilian. Relating to the crocodile or other Saurian reptiles.

Crop. The first stomach of a fowl; tbe craw.

Cruciate. Divided to the middle into four opposite arms, the angles being either four right ones, or two obtuse and two acute.

Cruciato-complicate. When the wings (of an insect) are crossed and folded.

Cruciato-incumbent. Wings crossed, but not folded, and covering the back.

Cruciform. Disposed in the form of a cross.

Crura. Processes resembling legs.

Crural. Belonging to the leg.

Crustaceous. Belonging to the class of articulated animals termed *Crustacea*, having a soft and jointed shell; as the crab, lobster, shrimp, &c.

Crustaceology. Tbat part of zoölogy whicb treats of crustaceous animals, arranging tbem in orders, tribes, and families, and describing their forms and habits.

Cryptobranchiate. Pertaining to those molluscous and articulate animals which have no conspicuous gills.

Crystalline. The white splendor of crystal or glass.

Cubical. Six-sided, with sides quadrate.

Cuboid; Cuboidal. Having the form of a cube, or differing but little from it.

Cucullate. When the prothorax is elevated into a kind of ventricose cowl or hood which receives tbe head.

Cucumiform. Cucumber-shaped: whose longitudinal section is oblong, and transverse circular.

Culiciform. In form resembling a flea.

Culmen. That part of the upper mandible of a bird which runs along the middle and often slopes on each side.

Cultrate; Cultrated. Straight on one side and curved on the other. Sharp-edged and pointed; as, the beak of a bird is convex and cultrated.

Cultriform. A three-sided body with two equal sides large and the third small.

Cuneate; Cuneated; Cuneiform. Shaped like a wedge. Having the longitudinal diameter exceeding the transverse, and narrowing gradually downwards.

Cupreous. Of the bright color of new copper.

Cursorial. Adapted for running.

Cuspidate. Terminating in a long setiform point.

Cutaneous. Existing on, or affecting, the skin.

Cuticle. A thin pellucid membrane covering the true skin.

Cuticular. Pertaining to the cuticle, or external coat of the skin.

Cyclobranchiata. Those molluscous animals which have the gills disposed in a circle.

Cylindrical. A mathematical form, which, like many others, is used by conchologists with great latitude, and applied to any sbell the body of which is somewbat straigbt, with the ends either rounded, flat, or conical.

Cylindriform. Having the form of a cylinder.

Cymbiform. Shaped like a boat. When the margins of the thorax and elytra of an insect are recurved so as to give a body the resemblance of the inside of a boat, they are said to be *cymbiform.*

Cyst. A bag or tunic which includes morbid matter in animal bodies.

D.

Decapodous. Pertaining to those crustaceous and molluscous animals which have ten feet.

Decaton. Tbe tenth segment of insects.

Deciduous. Parts which are annually shed, or do not last the lifetime of the animal. A shell is described as deciduous where there is a tendency in the apex of the spire to fall off.

Decollated. The term applied to univalve shells in which the apex or head is worn off in the progress of growth.

Decorticated. Divested of the epidermis or skin.

Decussated. An epithet generally applied to striæ, or lines which are crossed, or which intersect each other perpendicularly or horizontally.

Dedentition. Tbe shedding of teeth.

Deflexed; Deflected. Bent down; bent or turned aside. When the wings of insects at rest, covering each other, are so bent downwards as to imitate a

roof, of which their interior margin forms the ridge.

Dehiscence. The splitting open of the bag containing the insect's eggs.

Dehiscent. When the base-eovers diverge a little at the apex.

Deltoid. Triangnlar.

Dendritic. Branched like a tree.

Dentary. Relating to dentition, or to the teeth; as, the *dentary* system.

Dentate; Dentated. Toothed; having tooth-like processes.

Denticle. A small tooth or projecting point, like the tooth of a fine saw.

Denticulated. Set with small teeth.

Dentoid. Having the form ef teeth.

Denuded. Divested of covering; laid bare.

Depressed. Pressed down or flatted horizontally; low, shallow, flat.

Deplumed. Stripped of feathers or plumes.

Dermal. Belonging to the skin.

Desiccative. Having a tendency to exhaust moisture.

Detersive. Having power to eleanse from offensive matter.

Dextral. Right-handed. Spiral shells are said to be *dextral* when the aperture faces the right hand of the observer, the shell being held with the apex upwards.

Diameter. The thickness of a body, known by a right line passing through its centre.

Diaphanous. Clear and transparent.

Diaphragm. A muscular membrane placed transversely across the trnnk of the human body, at about its middle portion, dividing it into two pretty nearly equal portions: it is one of the chief organs of respiration, its chief function consisting in alternately increasing and diminishing the capacity of the thorax and abdomen. This term is also applied to the *septa*, by which the chambers of multilocular and other shells are divided from each other.

Dicerous. A term for any insect that has two antennæ.

Dichotomous. Dividing regularly in pairs.

Didactylous. Having two toes.

Didymous. When areolets are nearly divided into two by a nervure.

Diffused. Dispersed, or extended in all directions.

Digitated. Branched out into long points, or having finger-shaped processes.

Digitigrade. Walking on the tips of the toes.

Dilatability. The quality of admitting expansion by the elastic force of the body itself, or of another elastic substance acting upon it.

Dilatate. Disproportionably broad in part.

Dilatation. A spreading or extending in all directions.

Diluvial. Effected or produced by a deluge, more especially applied to the general deluge in the days of Noah.

Diluvium. A deposit of superficial loam, sand, gravel, &c., caused by the deluge.

Dimerous. When the trunk of an inseet consists of two greater segments.

Dimidiate. When the base-covers are about half the length of the abdomen.

Dimidiated. Divided into two equal parts.

Dimyary. A bivalve whose shell is closed by two muscles.

Dioptric; Dioptrical. Relating to that part of optics which treats of the refraction of light passing through different mediums, as through air, water, or glass.

Dipterous. Having two wings only. Pertaining to the *Diptera*, or those insects which have two wings.

Disc. The middle of a surface. The middle part of the valves of a shell, or that which lies hetween the umbo and the margin.

Discoid; Discoidal. Disc-shaped; mnch flattened. A spiral shell is said to be *discoidal*, when the whorls are so horizontally convolute as to form a flattened spire.

Discolorate. Of a different color from the other part. When the upper and under sides of *Lepidoptera* are of a different color.

Discontinuous. Where parts which are usually eonneeted are suddenly interrupted.

Discubitory. Inclining sideways; fitted to a leaning posture.

Discursive. Moving or roving about.

Disgorge. To eject or discharge from the stomach, throat, or mouth.

Dishevelled. Spread out loosely and in disorder.

Dishorned. Stripped of horns.

Disinfected. Cleansed from infection.

Disintegrated. Separated into integrant parts without chemical action.

Disjunct. When the head, trunk, and abdomen of an insect are separated by a deep incisure.

Dislocate. To put out of joint. In geology, the displacement of parts of rocks, or portions of strata, from the situations which they originally occupied.

Dismemberment. The act of severing a limb or limbs from the body; separation of the members; mutilation.

Disorganize. To break or destroy organic structure.

Displumed. Stripped or deprived of plumes or feathers.

Distichous. When the joints of the antennæ generally terminate in a fork.

Distinct. When spots, &c. do not touch or run into each other, but are completely separate.

Divaricate; Divaricated. Standing out very wide; spreading out widely. When wings of insects at rest are somewhat erect, but diverge from each other.

Divarication. A crossing or intersection of fibres at different angles.

Diverging. Tending to different parts from one point.

Doe. The female of the fallow-deer.

Dormant. Sleeping; in a state of rest and inaction.

Dorsal. Pertaining to the back; adhering to the back; as the *dorsal* fin of a fish. A *dorsal* shell is one placed on the back of the animal. The *dorsal* part of a bivalve shell is that on which the hinge is placed; the opposite margins are termed *ventral:* the *dorsal* surface of a spiral univalve is that which is seen when the aperture is turned from the observer.

Dorsibranchiate. Having gills attached to the back, as in Mollusca belonging to the *Dorsibranchiata.*

Dorso-intestinal. A part which is on the dorsal aspect of the intestines.

Dorsum. In conchology, the back or upper outward surface of the body of the shell, when laid upon the aperture or opening.

Dove-cot. A small building or box in which domestic pigeons breed.

Drake. The male of the duck kind.

Dredge. A drag-net for taking oysters and other Mollusca.

Duodenum. The first portion of the small intestines.

Duplicate-pectinate. When the antennæ are bipectinate with the branches on each side alternately long and short.

Duplicatile. Folded transversely, as the wings of some coleopterous insects.

Duplications (generally of the skin). Regular wrinkles or folds.

E.

Ecdysis. A sloughing or moulting of the skin, as in serpents and caterpillars.

Echinated. Set with spines, or bristled, like a hedgehog; when the surface is covered with pustules produced into spines.

Echinite. A calcareous petrifaction of the echinus or sea-hedgehog.

Edentulous. Toothless.

Edentate; Edentated. Destitute or deprived of teeth.

Edriophthalma. The Crustacea with sessile eyes.

Efflorescent. Shooting into white spiculæ, forming a white dust on the surface.

Effuse. Having the lips (of a shell) separated by a groove or channel.

Egest. To void, as excrement.

Egg. A body found in the females of birds and certain other animals, containing an embryo or fœtus of the same species, or a substance from which a like animal is produced. The eggs of fish and some other animals are united by a viscous substance, and called *spawn.* Most reptiles and insects are oviparous.

Eject. To discharge through the natural

passages or emunctories; to evacuate.

Elaborating. Improved by successive operations.

Element. The substance which forms the natural or most suitable habitation of an animal; as, water is the proper *element* of fishes; air, of man.

Elephantine. Pertaining to or resembling the elephant; huge.

Ellipsoid. Having the longitudinal section elliptical, and the transverse circular.

Elliptic. Oval, but having the longitudinal diameter more than twice the length of the transverse.

Elongated. Lengthened; extended to a considerable length.

Elytra. The external wings, or wing-cases, of coleopterous and other insects.

Emarginate; Emarginated. Notched or hollowed out; applied to the edges or margins of shells, when, instead of being level, they are hollowed out.

Embossed. Having several parts of a different shape and higher than the rest of the surface.

Embryo. The first rudiment of an animal in the womb.

Emunctories. Parts which serve to carry out of the body noxious particles or excrementitious matter.

Encephalous. Having a distinct head; as the molluscous animals termed *Encephalæ.*

Ennaton. The ninth segment in insects.

Ensate. Gradually tapering till it ends in a point.

Ensiform. Shaped like a sword.

Entire. Not interrupted; not emarginated.

Entomolite. A fossil or petrified insect.

Entomological. Pertaining to entomology, or that part of natural history which treats of insects.

Entomology. That branch of natural science which treats of insects.

Entomostraceous. Pertaining to an order of small Crustaceans, many of which are inclosed in an integument, like a bivalve shell.

Entozoa. Those parasitical animals which exist within other animals.

Entrochite. A kind of extraneous fossil, usually about an inch in length, and made up of round joints, which, when separated, are called trochites. They are striated from the centre to the circumference, and have a cavity in the middle.

Eocene. In geology, the older tertiary period, in which the extremely small proportion of living species indicates the commencement of the present existing state of animate creation.

Ephemeral. Beginning and ending in a day; as the *ephemera* or day-fly in its imago or perfect state.

Epidermal. Belonging to the cuticle, or scarf-skin.

Epidermis. The outer covering, or scarf-skin. The membranous covering, or fibrous horny coating of some shells.

Epigastric. Pertaining to the upper part of the abdomen; as, the *epigastric* region.

Epimeral. Pertaining to the segment of an articulated animal which is above the joint of the limb.

Epiphragm. The membranaceous or calcareous substance by which some species of Molluscs close the aperture of the shell when they retire within to hibernate.

Epiploon. The fatty membrane which covers or occupies the interspaces of the entrails in the abdomen.

Epistoma. The space between the antennæ and oral cavity in Crustacea.

Episternal. Pertaining to that part of an articulate animal which is immediately above the sternum.

Epithelium. The thin epidermal membrane which covers the mucous membranes.

Epizoa. The class of imperfectly organized parasitic Crustaceans which live upon other animals.

Epizootic. In geology, an epithet given to such mountains as contain animal remains in their natural or in a petrified state, or the impressions of animal substances. Also, an epithet for a disease which prevails among cattle, in the same manner as an epidemic does among men.

Equate. Witbout larger partial elevations or depressions.

Equicrural. Having legs of equal lengtb.

Equilateral. Having all sides alike: applied to bivalve shells, when a line drawn perpendicularly from the apex would divide the shell into two equal parts.

Equilibrity. The state of being equally balanced; equilibrium.

Equine. Pertaining to a horse or to the genus.

Equipendent. Hanging in equipoise.

Equivalve. Having botb valves of equal dimensions.

Equivorous. Feeding or subsisting on borse-flesb.

Erect. Nearly perpendicular.

Erectile. A term applied to a tissue peculiar to some part of the animal body; and which is formed of veins, arteries, and nervous filaments.

Erectro-patent. When tbe primary wings of an insect at rest are erect and tbe secondary horizontal.

Erose. Irregularly notcbed, as if gnawed.

Erubescence. Redness of the skin or surface of any tbing.

Eruginous, or *Æruginous.* Green, with a blue tint: the color of the rust of copper, verdigris.

Escargatoire. A nursery of snails.

Escharotic. Having the power of searing or destroying the flesb.

Esculent. Eatable, or that may safely be used by man as food.

Estival. Pertaining to summer, or continuing during the summer.

Ethmoidal. Pertaining to a bone at the top of tbe root of tbe nose, called the *ethmoid*.

Eupeptic. Having good digestion.

Eviscerated. Deprived of the intestines.

Exarticulation. The dislocation of a joint.

Excavate. A depression the arc of wbicb is not the segment of a circle.

Exscinded. Wben the end bas an *angular* notch taken out.

Excision. A cutting out or cutting off any part of the body.

Excoriated. Abraded; the skin or cuticle rubbed or worn off.

Excrementitious. Consisting of matter evacuated, or proper to be evacuated, from the animal body.

Excrescence. Any tumor, wart, or preternatural enlargement or superfluous part.

Excretory; Excretive. Having the quality of excreting or throwing off excrementitious matter by the glands.

Excurved. When curved outwards.

Exfoliated. Separated in thin scales, as a carious bone.

Exosseous. Witbout bones; destitute of bones.

Exotic. Produced in a foreign country.

Expalpate. When an imperfect mouth bas no palpi.

Expanded. When wings at rest are horizontally extended and do not cover each other.

Explanate. When the sides of the prothorax are so depressed and dilated as to form a broad margin.

Exsanguinous. Destitute of red blood.

Exscutellate. When an insect has no visible scutellum, it being wholly covered by the prothorax.

Exserted. When the bead of an insect is quite disengaged from tbe trunk.

Extended. Wben wings at rest do not lie upon the body.

Extensor (*muscle*). A muscle whicb serves to extend or straighten any part of the body, as an arm or finger: it is opposed to *flexor*.

Extinct. Having ceased to exist, and, when discovered, only found in a fossil state.

Extraocular. Applied to the antennæ when they are inserted on the outsides of the eyes.

Extrageneous. Belonging to another kind.

Extravasated. Forced or let out of its proper vessels; as, *extravasated* blood.

Exuviæ. Cast skins, shells, or coverings of animals, or any parts which are shed or cast off. Also, the remains of animals which at some period long antecedent were deposited in the earth.

Exuvial. Pertaining to the spoils or remains of animals found in the earth, supposed to have been deposited there at the deluge, or some great convulsion which the terraqueous globe has undergone.

F.

Facet. A small surface: applied to the composite eyes of insects.

Facial. Pertaining to the face; as the *facial* artery, nerve, &c.

Fæces. Excrement.

Falcate; Falcated. Bent or hooked like a scythe; curved, with the apex acute.

Falciform. Long and curved, in the shape of a sickle: a word applied to the mandibles of insects.

False Legs (*of insects*). Certain prehensile appendages on the lower segments of the body of the larvæ.

Fang. A tusk, or long, sharp-pointed tooth; a claw or talon.

Farinose. Covered with a fine mealy powder resembling flour.

Fascia. A broad transverse stripe, or colored band. A word much used in describing the paintings or markings of insects; as, *Pyramidate fascia,* a band which juts out into an angle on one side; *Macular fascia,* a band consisting of distinct spots; *Articulate fascia,* a band consisting of contiguous spots; *Dimidiate fascia,* a band traversing only half the wing; *Abbreviate fascia,* a band traversing less than half the wing; *Sesquialterous fascia,* when both wings are traversed by a continued band, and either the primary or secondary by another; *Sesquitertious fascia,* when a wing or elytrum contains a band and the third of a band.

Fasciated. Filleted, or covered with transverse bands.

Fascicle; Fasciculus. A small bundle, bunch, or tuft.

Fasciculate. When antennæ have several bundles of hair.

Fasciculated. Consisting of little bundles.

Fascicule. A bundle of thick-set hairs, often converging at the surface.

Fastigiate. When the base-covers are of equal or greater length than the abdomen, and transverse at the end.

Fauces. A cavity behind the tongue, from which the pharynx and larynx proceed.

Fauna. The animals indigenous or peculiar to any country.

Fawn-colored. A reddish-brown.

Feathered. Clothed or covered with feathers, as a bird.

Fecifork. The anal fork, on which the larvæ of certain insects carry their fæces.

Fecundated. Rendered prolific; impregnated.

Feline. Pertaining to cats, or to their species; as, the *feline* race, &c.

Femoral. Belonging to the thigh.

Femur. The second joint of the legs in insects.

Fenestrate. When one or two definite spaces in a Lepidopterous wing are denuded of scales.

Ferine. Wild; untamed; as lions, tigers, and other predatory animals.

Ferruginous. Of the color of rust; a yellowish brown with some red.

Festucine. Being of a straw color.

Fibre. A fine, slender, filiform body, which constitutes a part of the frame of animals. Some are soft and flexible, others more hard and elastic: some are nervous and fleshy, while others appear to be composed of still smaller fibres. They constitute the substance of the bones, cartilages, ligaments, membranes, nerves, veins, arteries, and muscles.

Fibril. An extremely slender fibre, or the branch of a fibre.

Fibrine. A soft, solid, white, slightly elastic and inodorous substance, constituting the principal part of animal muscle; it exists in the chyle, the blood, &c., and may be regarded as the most abundant constituent of animal bodies.

Fibrous. Composed or consisting of fibres; as, a *fibrous* body or substance.

Fibula. The outer and lesser bone of the leg, much smaller than the tibia.

Filamentous. Consisting of thread-like filaments.

Filiform. Thread-shaped: slender and of equal thickness.

Fimbriate; Fimbriated. Fringed; i. e. when a part is terminated by hairs or bristles that are not parallel.

Fin-footed. Palmated; having feet with toes connected by a membrane.

Finlet. A very small fin or process to assist a fish's motion.

Fissiparous. Capable of being multiplied by the voluntary cleavage of the individual into two parts.

Fissiped. Having the toes unconnected by a membrane.

Fissirostral. Belonging to the *Fissirostres*, a family of passerine birds of which the beak is short, broad, slightly hooked, and the opening of the mouth very wide. This family comprises the swallows and goat-suckers.

Fissure. A little cleft, or narrow chasm.

Fistula. The intermediate subquadrangular pipe, in insects, formed by the union of the two branches of the *antlia*, which conveys the nectar to the *pharynx*.

Flabellate. When the antennæ on one side send forth from the joints, except those at the base, long, flat, flexile branches, which open and shut like the sticks of a fan.

Flabelliform. Fan-shaped.

Flaccid. Soft and weak; hanging down by its own weight.

Flagellum. An appendage to the legs of Crustacea resembling a whip.

Flame-color. Of a bright color.

Flammiferous. Producing flame.

Fledged. Furnished with feathers, as a bird.

Fleeced. Furnished with a fleece; as, a sheep is well *fleeced.*

Flexile; Flexible. Yielding to pressure; that may be easily bent.

Flexor (muscle). A muscle whose office is to bend the part to which it belongs: it is opposed to *extensor.*

Flexuous. Bending; changing its course in a curved direction; with angles gently winding.

Flirt. A sudden jerk; a darting motion.

Flocculate. When the posterior coxæ are distinguished by a curling lock of hair.

Flocculent. Coalescing and adhering in small flakes.

Flushed. Suddenly aroused and on the wing; as a covey of partridges when surprised.

Fluviatile. Of or belonging to rivers, or to fresh water; living in fresh water.

Fœtus. The young of viviparous animals in the womb, and of oviparous in the egg, after it is perfectly formed; before which time it is called an *embryo.*

Foliaceous. Leaf-like; shaped or arranged like leaves; scarcely thicker than a leaf.

Foliated. Bent into laminæ; composed of thin plates, lying on each other, as in the shell of the oyster.

Foliolæ. Appendages of the *telum* of insects.

Follicle. A minute gland, or little bag, in animal bodies, serving the purposes of secretion.

Foraminous. Perforated; full of holes.

Forceps. An instrument formed somewhat after the manner of a pair of pincers or tongs, and used in surgery.

Forcipated. Formed like a *forceps*, to open and inclose.

Fore-legs. The first or anterior pair of legs.

Fornic (acid). The acid of ants.

Fornicate. Concave above and convex beneath.

Fossiliferous. Having the quality of, or tending to produce, fossils: applied to the strata which contain the remains of animals and plants.

Fossilize. To become or to be changed into a fossil.

Fossils. Bodies of animal or vegetable origin, as shells, bones, and other substances, accidentally buried in the earth, and become petrified.

Fossorial. A term applied to animals which dig their retreats and seek their food in the earth.

Fossorius. A term for the leg of an insect when with either palmate or digitate tibiæ.

Fossulate. Having one or more long and narrow depressions.

Foveolate. Having one or more rounded and rather deep depressions.

Frugivorous. Feeding on fruits, seeds, or corn, as birds and other animals.

Frumentarious. Pertaining to wheat or other grain.

Fry. A swarm or crowd of little fish.

Fulcrant. When the trochanter merely props the thigh below at the base, but does not at all intervene between it and the coxa.

Fulgid. Of a bright fiery red color.

Fuliginous. Of opaque black, or sooty.

Fulvous. Of a tawny or dull yellow color.

Fumous. Colored as if tinged with smoke.

Function. The peculiar or appropriate action of a member or part of the body, by which the animal economy is carried on; as, the *functions* of the brain and nerves, &c.

Fungus. A spongy excrescence in animal bodies; any morbid excrescence

Funicular. Consisting of a small cord, ligature, or fibre.

Funiculate. When the post-frænum forms a narrow ridge.

Furcate. Divided at the end into two prongs or branches.

Furcula. A forked bone in the upper part of the breast of a bird, familiarly called the *merrythought*, when speaking of the joint of a fowl at table.

Furfuraceous. Scurfy; scaly.

Fuscous. Of a dull dark-brown color.

Fusiform. Spindle-shaped; swelling in the middle, and rather tapering to each end: whose *vertical* section is lanceolate or lineari-lanceolate, and horizontal circular.

G.

Galeated. Having feathers on the head which in shape appear like a helmet.

Gallinaceous. Belonging to the order *Gallinæ*, which includes domestic poultry, pheasants, &c.

Galloway. A small-sized species of horse, bred in Galloway, in Scotland.

Ganglion. A mass of nervous matter, forming a centre from which nervous fibres radiate.

Gangrene. Mortification of some part of a living animal body.

Gangrenescent. Tending to putrefaction, as living flesh in a diseased state.

Gaping. When the margins of bivalve shells do not meet all round, they are said to *gape*.

Garous. Resembling pickle made of fish.

Gasteropodous. Belonging to the *Gasteropoda*, a class of molluscous animals distinguished by having the locomotive organ attached to the under part of the body.

Gastric. Belonging to the stomach; as the *gastric juice*, which is the principal agent in digestion.

Gazehound. A hound that pursues by the sight rather than by the scent.

Gelatine. A concrete animal substance. transparent, and soluble slowly in cold water, but rapidly in warm water.

Gelatinous. Composed of a jelly-like substance; being moderately stiff and cohesive.

Gemilliparous. Producing twins.

Geminated. Marked with a double elevated stria connecting the wreaths, as in certain shells.

Geminous. When there is a pair of spots, tubercles, puncta, &c.

Gemmiparous. Endued with the power of propagation from the growth of the young, like a bud from the parent.

Gemmules. The embryos of the radiated animals at that stage when they resemble ciliated monads.

Generate. To procreate; as, every animal *generates* his own species.

Generic. Pertaining to a genus or kind, as distinct from species or from another genus; thus, a *generic* name is the denomination which comprehends all the species; *Canis*, for example, is the *generic* name of animals of the dog kind; *Felis*, of the cat kind; *Struthis* is the *generic* name of birds of the ostrich kind; *Hirundo*, that of swallows.

Geniculated. Having joints like the knee, bent so as to form a knee or angle.

Genus (pl. *Genera*). An assemblage of species possessing certain characters in common, by which they are distinguished from all others. It is subordinate to *class* and *order*, and in some arrangement, to *tribe* and *family*. A single species, possessing certain peculiar characters which belong to no other species, may also constitute a genus; as the giraffe.

Geognostic. Pertaining to a knowledge of the structure of the earth.

Geological. Relating to the substances

of which the earth is composed, their formation, structure, &c.

Gestation. Pregnancy; the act of carrying young in the womb from the period of conception to the birth.

Gibbose. Having one or more large elevations.

Gibbous. An elevation whose arc is not the segment of a circle. In anatomy, it denotes any unnatural protuberance or convexity of the body, as a person humpbacked.

Gill. The organ of respiration in fishes.

Ginglymus. A species of articulation resembling a hinge.

Glabrous. Having a smooth surface: a term which, either applied to quadrupeds or insects, denotes those parts of the surface which are naturally devoid of hair or pubescence.

Glacial; Glacious. Consisting of or like ice.

Glareous. Viscous and transparent, like the white of an egg.

Glaucous. Of a pale grayish-blue color; that fine, dull green-blue passing into blue, which is seen on certain bodies, is described by the word *glaucous.*

Glirine. Belonging to that order of Mammalia which includes such animals as have two fore-teeth, a cutting one in each jaw, no tusks, and feet with claws; comprehending guinea-pigs, rabbits, hares, squirrels, mice, beavers, &c.

Globiferous. When the setigerous joint of the antennæ is larger than the preceding one, and globose.

Globose. Orbicular; globe-shaped.

Globule. A small particle of matter of a spherical form: a word applied to the red particles of blood which swim in a transparent serum, and may be discovered by the microscope.

Glossarial. Explanatory; containing explanations of scientific or technical terms.

Glottis. The narrow opening at the upper part of the windpipe, which, by its dilation and contraction, contributes to the modulation of the voice.

Gluten. That part of the blood, in animals, which gives firmness to its texture.

Glutinous. Viscid; having the quality of glue; tenacious.

Gossamer. A fine, filmy substance, like cobwebs, floating in the air, in calm clear weather, especially in autumn It is probably formed by a species of spider.

Grallatorial. Belonging to the *Grallatores*, an order of birds having long legs, naked above the knees, which fit them for wading in the water.

Graminivorous. Feeding or subsisting on grass: an epithet applied to animals which subsist wholly on vegetable food, to distinguish them from carnivorous animals.

Granivorous. Feeding or subsisting on grain or seeds; as *granivorous* birds.

Granular; Granulous. Consisting of grains.

Granulated. Covered with minute grains; feeling or appearing as if formed of small grains or granular substance, as shagreen.

Granule. A small particle; a little grain; a very minute elevation.

Gregarious. Having the habit of assembling or living in a flock or herd. Cattle and sheep are *gregarious;* so are many species of birds.

Griseous. White mottled with black or brown.

Ground-bait. Bait for fish which sinks to the bottom of the water.

Grumous. Thick; clotted; as, *grumous* blood.

Gullet. The passage in the neck of an animal by which food and liquor are taken into the stomach.

Gum-lac. The produce of a homopterous insect which deposits its eggs on the branches of a tree called *bihar*, in Assam, and elsewhere in Asia.

Gutta. A very small round dot, intermediate in size between an *atom* and a *macula*.

Guttate. Sprinkled with *guttæ*, or minute round spots.

Guttulous. In the form of small drops.

H.

Habitat. The natural place or permanent abode.

Habitude. Customary manner or mode of life.
Haliotoid. Ear-shaped.
Halteres. Two small club-like appendages which occur in *Diptera*, and which are supposed to be identical with the hind wings of other insects.
Hamate. Hooked, or set on with hooks.
Hamiform. Curved at the extremity.
Hamstring. To cut the tendons of the ham, and thus to lame or disable.
Hare-lipped. Having a divided upper lip, like that of the hare.
Harengiform. Shaped like a herring.
Harpooned. Struck or killed with a *harpoon*, which is a kind of spear, thrown by the hand, used for taking whales. It consists of a long shank, with a broad, flat, triangular head, sharpened at both edges for penetrating the whale with facility.
Hart. A stag or male deer.
Hartshorn. The horn of the hart or male deer, the raspings of which are used medicinally; *hartshorn jelly* is nutritive and strengthening; and the *salt* of *hartshorn* yields a pungent volatile spirit. It is composed of muriate of ammonia, with a little animal oil.
Hastate. Halberd-shaped: triangular, hollowed out at the base and sides with the posterior angles spreading.
Haustellate. Pertaining to those insects the structure of whose mouth is adapted for drinking or pumping up liquids.
Haustellum. The instrument of suction (in insects) contained in the *theca*.
Helical. Spiral; winding.
Heliciform. Shaped like the *Helix* or snail-shell.
Helicite. Fossil remains of the *Helix*.
Helminthoid. Worm-shaped.
Helminthological. Pertaining to worms or to their history.
Hemelytra. A wing, of which one half is opaque and firm like the elytra of coleopterous insects.
Hemidactyle. Having an oval disc at the base of the toes, as is the case with some species of Saurian reptiles.
Hemipteral. Having wings or wing-cases like the *Hemiptera*.
Hemipterous. Belonging to the *Hemiptera*, an order of insects in which the anterior wings are half crustaceous and half membranaceous.
Hemorrhage. A flux of blood, proceeding from the rupture of a bloodvessel, or some other cause.
Hepatic. Pertaining to the liver.
Herbicarnivorous. Subsisting both on vegetable and animal food.
Herbivorous. Feeding or subsisting on grass and herbaceous plants.
Herculean. Of extraordinary strength and size.
Hermaphrodite. An animal in which male and female characteristics are combined.
Hermaphroditic. Partaking of both sexes.
Herpetic. Pertaining to the *herpes*, or subject to cutaneous eruptions.
Herpetology. The natural history of reptiles.
Hesperian. Western; inhabiting a western country.
Heteroclyte. Anomalous; deviating from the ordinary form.
Heterodactyle. Having the toes irregular, either as to number or formation.
Heterogangliate. Having the ganglionic nervous system, and the ganglions often unsymmetrically scattered.
Heterogeneous. Dissimilar or different in kind or nature.
Heteromorphous. Of an irregular or unusual form.
Heteropodous. Pertaining to the *Heteropoda*, an order of the class Mollusca.
Heterostrophe. Reversed: a term applied to shells whose spires turn in a contrary direction to the usual way.
Hexadactylous. Having six toes.
Hexaped. Having six feet.
Hexapod. An animal with six legs, such as a true insect.
Hide. The skin of an animal, either raw or dressed.
Hidebound. When the skin sticks so closely to the ribs and back of an animal as not to be easily loosened or raised.
Hind. The female of the red deer or stag.
Hippophagous. Feeding on horse-flesh.
Hinge. The part where the valves of a bivalve shell are united, consisting of ligament and teeth.

Hirsute. Thickly set with long, stiffish, rough hairs; shaggy.

Hispid. Beset with bristles or stiff hairs.

Histological. Pertaining to the doctrine of the tissues which enter into the formation of an animal and its various organs.

Hive. A box or kind of basket for the reception and habitation of a swarm of honey-bees; or the bees inhabiting a hive. Also, to collect into a hive.

Hoary. White or gray with age; covered with a whitish pubescence.

Holosericeous. Covered with thick-set, short, decumbent hairs, a kind of pubescence resembling satin.

Homogangliate. Pertaining to the ganglionic nervous system in animals, and symmetrical arrangement of the ganglions.

Homogeneous. Of the same kind or nature.

Homologue. The same organ in different animals under every variety of form and function.

Homologous. Proportional to each other.

Homomorphous. Of similar form.

Homoptera. A section of the hemipterous order of insects, whose four wings have a similar structure.

Honey-bag. The stomach of a honey-bee.

Honey-comb. A thick, viscid, tenacious substance, formed by bees into hexagonal cells for repositories of honey, and for the eggs which produce their young.

Hoof. The horny substance that covers the feet of certain animals, as horses, oxen, deer, &c.

Hoof-bound. A term denoting that the horse or other hoofed animal has a pain in the fore-feet, occasioned by the dryness and contraction of the horn, which often occasions lameness.

Humbles; Umbles. The entrails of a deer.

Humeral. Pertaining to the *humerus* or shoulder; as, the *humeral* artery.

Hunter. A man who, either for sport or for food, pursues wild animals with a view to take them. A horse used in the chase.

Hyaline. Glassy; thin; transparent. The pellucid substance which determines the spontaneous fission of shells.

Hybernaculum; Hybernacle. A place chosen by an animal for its winter retreat.

Hybernate. To pass the winter season in close quarters or in seclusion, and sometimes in a dormant state.

Hybrid. Produced from the mixture of two species. A mongrel.

Hybridize. To procreate by the mixture of two different species; to propagate mongrels or mules.

Hydatid. A little transparent vesicle containing serous fluid, sometimes found detached in the body of an animal, and sometimes adhering to the different viscera. Some have an organized head and neck, possess an independent vitality, and are considered as constituting distinct animals.

Hydriform. Formed like the fresh-water polypes to which the name of *Hydra* is given.

Hydrophobia. A preternatural dread of water; a symptom of canine madness, or disease itself.

Hydrozoa. The class of polypes organized like the *Hydra.*

Hyemal. Belonging to winter.

Hymenopterous. Pertaining to the *Hymenoptera*, an order of insects having four membranous wings, including the wasp, bee, &c.

I.

Ichthyology. That part of zoölogy which treats of fishes, their structure, form, and classification, their habits, uses, &c.

Ichthyophagous. Feeding or subsisting on fish.

Idiopathic. A term indicative of a disease peculiar to a part of the body, and not arising from any preceding disease: opposed to *sympathetic*, when it is the consequence of some other disorder.

Imago. The last and adult state of insect life, i. e. the third or perfect state of insects, when they appear in their proper shapes and colors, and undergo no more transformations.

Imbibition. The act of drinking in or absorbing.

Imbricated. Lapping over each other, like the tiles of a house, or as the scales of some fishes and insects.

Immarginate. Being without a margin.

Immiscible. Not capable of being mixed.

Immature. That has not acquired its perfect form or full color.

Impennates. Swimming birds having short wings, as the penguin.

Impermeable. Not to be passed through the pores by a fluid.

Imporous. Close or compact in texture; perfectly solid.

Impotent. Deficient in natural power, animal or intellectual.

Impregnated. Rendered prolific or fruitful.

Inarticulated. Not jointed.

Inaurate. When striæ or other *impressed* parts have a metallic splendor.

Incised. Cut into equal marginal segments.

Incisors. The fore-teeth; the teeth used for cutting or separating the food; an important generic character in zoölogical science.

Incisure. A deep incision between the segments of an insect, when they recede from each other.

Inconspicuous. Not to be perceived by the sight.

Incrassate. Disproportionally thick in any part.

Incruental. Not attended with blood.

Incubation. The act of sitting on eggs for the purpose of hatching young.

Incumbent. Lying over another.

Incurvated. Turned from a rectilinear direction.

Incurved. Turned inwards or bent forwards. The apex of a shell is said to be *incurved* when it is bent inwards, but not sufficiently so to be described as spiral.

Indeciduous. Not falling off; lasting.

Indented. Exactly the reverse of *dentated;* meaning a series of small cavities, such as might be formed by the entrance of teeth.

Indigenous. Produced naturally in a country; not exotic.

Individualize. To distinguish the peculiar properties of one from another: the word *individual* and its derivatives are, however, rarely applied to any but human beings.

Inequilateral. When the anterior and posterior sides of a bivalve shell are unequal in length.

Inequivalve. When one valve is more convex than another, or dissimilar in other respects, as in the common oyster.

Infecundity. Unfruitfulness; barrenness.

Inferior Valve (applied only to attached bivalves). The valve that is attached to submarine bodies.

Inflected. Bent inwards.

Inflexed. When the head of an insect forms inwards an *acute* angle with the trunk.

Infundibuliform. Funnel-shaped. Whose horizontal sections are circular, at first equal and then progressively larger and larger.

Infuscate. To darken. When a color is darkened by the superinduction of a brownish shade or cloud.

Inguinal. Pertaining to the groin.

Innocuous. Harmless; producing no ill effect. This word is applied only to *things*, not to persons: as, there are some poisons used as medicines, which, if taken in small quantities, prove not only *innocuous*, but beneficial.

Inocular. When the antennæ are inserted in the *canthus* of the eyes.

Inodorous. Wanting scent; having no smell.

Inopercular. A term applied to univalve shells which have no operculum, or lid.

Inorganic. Not formed with the organs or instruments of life.

Inosculation. The union of two vessels of an animal body at their extremities, by means of which a communication is maintained and the circulation of fluids is carried on.

Inscribed. When the surface is marked with the resemblance of a letter of any language.

Insect. A small invertebrate animal, breathing by lateral spiracles, and furnished with articulated extremities and movable antennæ.

Insectile. Having the nature of insects.

Insectivorous. Subsisting on insects.
Instinct. The operation of the principle of organized life, independent of all instruction or experience, but by which animals are unerringly directed to do spontaneously whatever is necessary for the preservation of the individual or the continuation of their kind.
Instinctive. Prompted by instinct; acting spontaneously, without reasoning, instruction, or experience.
Instrumenta Cibaria. The parts of the mouth in insects concerned in the acquisition and preparation of the food.
Intactable. Not perceptible to the touch.
Integument. A covering which naturally invests the body, as the skin of an animal or the shell of a Crustacean; or a membrane that invests a particular part.
Intellect. The understanding; that faculty of the human mind which receives or comprehends the ideas communicated to it by the senses or by perception, or by other means.
Intellectual. Pertaining to the *intellect;* perceived by the understanding, not by the senses.
Intelligence. Understanding; skill.
Interambulacra. The imperforated plates which occupy the intervals of the perforated ones, or *ambulacra*, in the shells of Echinoderma.
Intercostal. Placed between the ribs; as, an *intercostal* muscle, artery, or vein.
Interganglionic. Belonging to the nervous chords in the intervals of the ganglions, which they connect together.
Intermaxillary. Situated between the jaws.
Intermigration. Reciprocal migration.
Intermuscular. Between the muscles.
Internodal. Having a space between one knot or joint and another.
Interocular. When the antennæ of an insect are inserted anywhere between the eyes.
Interorbital. Situated between the orbits.
Interosseous. Situated between bones; as an *interosseous* ligament or muscle.
Interscapular. Situated between the shoulders.
Intersected. Cut or divided into parts by being crossed.
Interstice. In insects, the space between elevations and depressions running in lines.
Interstitial. Relating to the intervals between parts.
Intertropical. Pertaining to those countries which lie between the tropics.
Interval. An entomological term denoting the space between irregular and scattered elevations and depressions.
Intestinal. Pertaining to the intestines of an animal body; as, the *intestinal* tube or canal.
Intromit. To enter or to allow to enter; to be the medium by which a thing enters or is admitted.
Introsusception. The passing of one part of an intestine within another, causing a duplicature of it.
Intruded. When the head of an insect is nearly withdrawn within the trunk.
Invertebrate. Destitute of a backbone or vertebral chain.
Involute. Rolled inwards. Where the exterior lip of a shell is turned inwards at the margin, as in the Cypræa.
Iridescent. Having colors like the rainbow.
Iris (pl. *Irides*). The colored circle which surrounds the pupil of the eye, by means of which that opening is enlarged and diminished.
Irradiated. Made luminous, bright, or shining.
Irrespirable. Unfit for respiration.
Irrigate. To water, as land, by causing a stream to flow upon it and spread over it.
Irrograted. Sprinkled or moistened with atoms, as the earth with dew.
Isabel or *Isabella-color.* A brownish-yellow color, with a shade of dark-red.
Ischiadic (from *ischium*, the hip). Pertaining to a rheumatic affection of the hip-joint, generally termed *sciatica.*
Islet. In entomology, a spot of a different color, included in a plaga or macula.
Isopoda. An order of Crustaceans in which the feet are alike and equal.
Isolated. Detached from others of a like kind; standing alone.
Itinerant. Wandering; not settled.

J.

Jubate. Having long, pendent hairs in a continued series, as in some insects

Jugular. Pertaining to the neck or throat; as, the *jugular* vein.

Juncture. A joint or articulation; a seam or line at which a union between two bodies is effected.

K.

Knag. The shoot of a deer's horns.

Knee-brushes. The tufts of hair on the knees of some antelopes; also, the thickest hairs on the legs of bees, with which they carry the pollen to the hive.

L.

Labiodental. Formed or pronounced by the coöperation of the lips and teeth.

Labipalpi. The labial feelers in insects: two jointed sensiferous organs, which emerge, one on each side, from the *labium*, mostly near its summit.

Labium. The lower lip of insects, to which the *labial palpi* are attached: it is often biarticulate. Also, the *inner lip* of a shell, or that side of the aperture which is nearest the axis, and generally contiguous to the body whorl.

Labrum. The upper lip, when applied to insects. Also, the *outer lip* of a shell; or the edge of the aperture at the greatest distance from the axis.

Lac, or *Gum-lac.* A kind of resin deposited on different species of trees in the East Indies, by an insect called *Chermes lacca.* It is variously combined, and much used in the arts.

Lacertine. Resembling a lizard in form or habits.

Lachrymal. Generating or secreting tears.

Lacinia. The blade of the maxillæ, being the fourth or apical portion.

Laciniate. Jagged, or cut into irregular segments.

Laciniform. When the base-covers of an insect are long, of an irregular shape, and appear like lappets on each side of the trunk.

Lacteal. Pertaining to certain vessels in animal bodies for conveying chyle from the intestines to the common reservatory.

Lacteous. White, less intense than niveous.

Lactescent. Producing or abounding with milk or white juice.

Lactiferous. Bearing or conveying milk or white juice; as a *lactiferous* duct.

Lacunose. Having the surface covered with pits or shallow excavations.

Lagoon; Lagune. A fen, moor, marsh, shallow pond or lake; as, the *lagunes* of Venice.

Lamb. The young of the sheep kind.

Lamellar. Consisting of films or thin plates.

Lamellated. Divided into distinct layers, plates, or foliations.

Lamellibranchiate. Belonging to the class of Acephalous Mollusca with gills in the form of membranous plates.

Lamelliform. Shaped like a thin plate or leaf.

Laminæ. Thin plates, laid one coat above another. Hence also *laminated*, disposed in layers, scales, or plates; and *lamination*, arrangement in layers.

Laminate. When the posterior coxæ of insects form a broad thin plate which covers the trochanter and the base of the thighs.

Lanate. Covered with fine, very long, flexible, and rather curling hairs, like wool.

Lanceolate. Flat, oblong, and gradually tapering to a sharp point, like the head of a lance.

Laniariform. Shaped like the canine teeth of the Carnivora.

Laniferous. Bearing or producing wool.

Lanuginose; Lanuginous. Covered with longish, very soft, fine down.

Larva. The first active stage in an insect's life; the caterpillar state, or that which precedes the chrysalis and perfect insect.

Larval. Pertaining to larvæ, or insects in the caterpillar state.

Larvate. Masked, as a larva or caterpillar.

Larviform. Shaped like a larva.

Larviparous. Relating to the *Larvipara*, viz. those insects which produce their young in the condition of larvæ, instead of eggs.
Laryngeal. Pertaining to larynx.
Larynx. The upper part of the windpipe or trachea.
Lateral. Placed at the side, or extending from one side to the centre.
Lateral Teeth (in shells). Those teeth which, taking their rise near the umbones, proceed to some distance towards the sides of the shell.
Lateritious. Of the color of brick-dust.
Latescence. Tendency to milk; milkiness or milky color.
Latitude. The distance of any place on the globe, north or south of the equator.
Latticed. Formed with cross-bars or open squares like network.
Lay. To produce eggs.
Leguminous. Pertaining to pulse, as peas, beans, &c.
Lemniscus (a *ribbon*, Lat.). A term applied to the minute ribbon-shaped appendages of the generative pores in *Entoaza.*
Lenticular. Doubly convex, of the form of a lens: i. e. having the opposite sides convex and meeting in a sharp edge.
Lepidopterous. Pertaining to the *Lepidoptera*, the order of insects in which the wings are clothed with fine scales, as butterflies and moths.
Leporine. Pertaining to, or having the nature or qualities of, the hare.
Lethargic. Preternaturally inclined to sleep.
Levigate. Without any partial elevations or depressions.
Libidinous. Lustful.
Ligament. A strong, compact substance, softer than a cartilage, but harder than a membrane, serving either to bind one bone of an animal to another, or to connect the valves in bivalve shells.
Ligamental; Ligamentous. Of the nature of a ligament; as a *ligamentous* membrane.
Ligneous. Composed of a hard, unelastic substance, like *wood.*
Ligniform. Resembling wood.
Lignite. Fossil or bituminous wood.
Ligula. The terminal or apical portion of the *labium* in insects.
Liguliform. When the tongue of an insect emerges from the labium, is short, flat, and not concealed within the mouth. Ex. *Vespa* and many *Hymenoptera.*
Lilac. Of a color resembling the flowers of the lilac.
Liliaceous. Lily-like, or pertaining to lilies.
Limb. A projecting member of the body; as an arm or a leg. Also, a term used for the disc of bivalve shells.
Limbless. Destitute of limbs.
Lineal. Allied by direct descent. In the direction of a line.
Linear. Narrow and of the same width throughout.
Lineated. Having lines on the surface.
Lines of Growth (in conchology). The concentric striæ or lines formed by the edges of the successive layers of shelly matter deposited by the animal, by which it increases the shell.
Lingua. The tongue of insects, attached to the inner surface of the lower lip.
Linguadental. Formed or uttered by the joint use of the tongue and teeth.
Linguaform. In the shape of a tongue.
Linguiform. When the tongue of an insect is quite distinct from the labium, usually retracted within the mouth, short, and shaped something like a vertebrate tongue.
Lips (in conchology). The two sides of the aperture of spiral shells: that which joins the columella is the *inner*, and that part of the circumference opposite is called the *outer* lip.
Liquefiable. That may be melted, or changed from a solid to a liquid state.
Liquescent. Becoming fluid.
Lithocarp. Petrified fruit.
Lithodendron. A name sometimes given to coral on account of its resembling a petrified branch.
Lithoxyle. Petrified wood; wood converted into stone.
Littoral. Belonging to, or growing on, the shore.
Lituite. A fossil shell.

Livid. A pale purplish-brown; the color of a bruise.
Lobated. Rounded at the edges.
Lobed. Having lobes, or broad finger-like divisions.
Lobule. A small lobe.
Loins. The space on each side of the vertebræ, between the lowest of the false ribs and the upper portion of the haunch-bone (*os ilium*).
Longeval; Longevous. Long-lived.
Longevity. Great length of life.
Longimanous. Having long hands.
Longitude. The distance of any place on the globe from another place, eastward or westward.
Longitudinal. Extending in length.
Looming. Appearing above the surface, or indistinctly, at a distance.
Lophobranchiate. Belonging to the *Lophobranchia*, an order of bony fishes, mostly of a small kind, distinguished by their gills being in tufts, and generally also by the body being covered by shields or small plates, which give it an angular form.
Lore. The space between the bill and the eye, which in some birds is bare, but is more generally covered with feathers.
Loricate; Loricated. Covered or plated over; covered with a double series of oblique scales like a coat of mail.
Lubricate. To make smooth or slippery.
Lubricous. Slippery, as if lubricated.
Lubrifaction. The act of making smooth.
Luciferous. Giving light.
Luciform. Resembling light.
Lumbar. Pertaining to the loins. The *lumbar region* is the posterior portion of the body between the false ribs and the upper edge of the haunch-bone.
Luminous. Bright; shining; emitting light.
Lunar. Measured by the revolutions of the moon.
Lunated; Luniform. In the shape of a crescent.
Lunisolar. Compounded of the revolutions of the sun and moon.
Lunule. A crescent-like mark or spot, situated near the anterior and posterior slopes in bivalve shells.
Lurcher. A dog that lies in wait and watches for his game.
Lurid. Of a dirty-yellow color: yellow with some mixture of brown.
Lustrous. Of a shining or glossy appearance, like silk.
Lutarious. Living in mud: pertaining to, or being of the color of mud.
Luteous. Deep-yellow with a tint of red. The color of the yolk of an egg.
Lutulent. Muddy; turbid; thick.
Luxated. Put out of joint; dislocated.
Lymnite. A kind of fresh-water snail found as a fossil.
Lymph. A colorless fluid in animal bodies, separated from the blood and contained in certain vessels called *lymphatics*.
Lympheduct. A vessel of animal bodies which contains the lymph.
Lyrate; Lyrated. Divided transversely into several jags, the lower ones smaller and more remote from each other than the upper ones.

M.

Maceration. The process of making thin or lean by wearing away; or the operation of softening and almost dissolving by steeping in a fluid.
Macrocosm. The universe, or the visible systems of worlds; opposed to *microcosm*, or the world of man.
Macrodactylous. Furnished with long toes adapted for traversing floating leaves and aquatic herbage.
Macroura. The tribe of decapod Crustacea which have long tails, as the lobster.
Macrourous. Pertaining to the Crustaceans above designated.
Macular Fascia. A band consisting of distinct spots, as seen on the wings of some insects.
Macula. A roundish but indeterminately-shaped spot, not elongated in any direction.
Maculate. Marked with *macula*, as above described.
Maculated. Spotted; stained.
Malacology. The science which describes molluscous animals, whether defended by a shell or entirely naked.
Malacopterygious. Belonging to the *Malacopterygii*, the name given to the sec-

ond great division of *Osseous Fishes;* the species of which are distinguished by the fin-rays being soft and cartilaginous. They are divided into three sections: 1. *Abdominales*, in which the ventral fins are situated in the abdomen, far behind the pectorals, as in the carp, salmon, and herring tribes; 2. *Subbrachiales*, in which the ventral fins are situated immediately beneath the pectorals, and the pelvis is suspended to the bones of the shoulder, as in codfish, haddock, flounder, &c.; 3. *Apodes*, in which the ventrals are wanting, as in the eel.

Malacostomous. Having soft jaws without teeth: a term applied to several extensive genera of fishes which are wholly destitute of teeth in their jaws, but have them placed in their throats, near the orifice of the stomach.

Malacostracous. An epithet applied to soft-shelled insects: from *Malacostraca*, the name of a division of the class *Crustacea*, including those which are covered with a crust softer than the shell of a mollusc, but harder than the horny integument of the *Entomostracoa.*

Mammæ. The paps or breasts.

Mammalia. The class of animals which give suck to their young.

Mammalogy. The science which has for its object the study and classification of all animals belonging to the class *Mammalia.*

Mammiferous. Having breasts and nourishing the young by the milk therein secreted.

Mammiform. Having the shape or form of paps.

Mammillate. When the last joint of the *palpi* is very short, smaller than the preceding one, and retractile within it.

Mammillated. Having little globes like nipples. A term applied to the apex of a shell when it is rounded like a teat. This epithet is also applied in anatomy to two small protuberances, like nipples, found under the fore ventricles of the brain, and to a process of the temple-bone.

Mandibles. The upper and under parts of the bill, in birds. The instruments of chewing; applied to birds and insects. The term *mandible* is restricted in entomology to the upper and outer pair of jaws.

Mandibular. Belonging to the jaw.

Mandibulata. The insects whose mouths are provided with jaws for the purpose of mastication.

Mandibuliform. When the under jaws of an insect are hard and horny, and shaped like the upper jaws.

Manducation. The act of chewing or eating.

Mange. The scab or itch in dogs, cattle, and other beasts.

Manners. Habits and mode of life.

Mantle. The external soft contractile skin of the Mollusca, which covers the viscera and a great part of the body like a cloak.

Maniform. When the *palpi* or feelers of an insect are chelate, or furnished with a finger and thumb.

Maritime. Bordering on, or situated near, the sea.

Mare. The female of the horse, or equine genus of quadrupeds.

Margaritaceous. Pearly.

Margaritiferous. Pearl-bearing: applied to shells which form pearls; as *Meleagrina Margaritifera*, or pearl-bearing oyster.

Marginal. Near the margin or edge. When applied to the wings of insects, it denotes open areolets that terminate in the margin.

Marginate; Marginated. Having a prominent margin or border.

Marigenous. Produced in or by the sea.

Marine. Belonging to, or found in, the sea.

Marmorate. So painted with veins, streaks, and clouds as to resemble marble.

Marmorean; Marmoraceous. Made of, or incrusted with, marble.

Marsupial. A term designating those animals which are provided with a tegumentary pouch, in which the embryo is received after birth, and protected during the completion of its development.

Marsupialian. Belonging to the class *Marsupialia.*

Masculine. Robust; strong; having the qualities of a man.

Masticate. To chew food; to grind food with the teeth, and prepare it for swallowing and digestion.

Mastigia. Two anal organs in the larvæ of *Cerura Vinula*, exserting from their apex a retractile flexible thread, with which they endeavor, by lashing their sides, to drive away the *Ichneumons*.

Mastoid. Resembling the nipple or breast; as, the *mastoid* muscles.

Mate. The male or female of animals which associate for propagation and the care of their young.

Matrix; Matrice. The womb or cavity in which the fœtus of an animal is formed and nourished till its birth.

Matter. The substance of which all bodies are composed; and which is of two kinds, solid and fluid.

Mature. Perfected by time or natural growth.

Maxillæ. The second or lower pair of jaws in insects, distinguished by bearing feelers.

Maxillary. Pertaining to the jaw.

Maxipalpi. The feelers of the *maxillæ*.

Medial. Placed in the middle.

Median. Having reference to the middle line of the body.

Medicated. Prepared or furnished with any thing medicinal.

Medicament. Any healing application.

Medipectoral. Pertaining to the mid-legs of insects, which are affixed to the *medipertus*.

Medulla Oblongata. The oblong medullary column at the base of the brain, from which the spinal chord or marrow is continued.

Medullar; Medullary. Consisting of marrow.

Melicerous. Consisting of matter like honey.

Melliferous. Producing honey.

Membranaceous; Membranous. Composed of delicate, transparent membranes, as the wings of insects: consisting of membranes.

Membraniform. Having the form of a membrane.

Mentum. The anterior part of the *gula*, immediately adjoining the *labium*.

Mephitic. Foul; pestilential; destructive to life.

Meretricious. Having a gaudy but deceitful appearance.

Mermaid. A fabulous marine animal, said to resemble a woman in the upper parts of the body, and a fish in the lower part.

Mesogastric. The term applied to the membrane by which the stomach is attached to the abdomen.

Mesonotum. The upper surface of the *mesothorax*, or middle part of that half of the segment which covers the back.

Mesopleura. The lateral surfaces of the *mesothorax*.

Mesopodes. The middle pair of legs.

Mesosternum. The sternum of the *mesothorax*, or middle part of that half of the segment which covers the breast.

Mesothorax. The intermediate of the three segments which form the thorax of an insect, bearing the posterior wings and legs.

Metacarpus. In anatomy, the part of the hand between the wrist and the fingers.

Metamorphosis. Change of form or shape; as, the *metamorphosis* of an insect from the chrysalis state into a winged animal.

Metamorphotic. A term employed to denote those insects which, during their state of existence, undergo one or more changes or transformations.

Metanotum. The upper surface of the *metathorax*.

Metapedes. The hind legs of an insect.

Metapleura. The lateral surfaces of the *metathorax*.

Metapodeon. The seventh segment in insects.

Metasternum. The under surface of the *metathorax*.

Metathorax. The hindmost of the three segments which form the thorax in insects.

Meticulous. Very timid.

Microscopic. Visible only by the aid of a microscope; as, a *microscopic* insect.

Migrate. To pass or remove from one region or climate to another; as, certain species of birds *migrate* in autumn to a warmer climate for a temporary residence.

Migratory. Removing or accustomed to remove from one climate to another; as, *migratory* birds.

Millepore. A genus of Lithophytes, of various forms, which have the surface perforated with little holes or pores, or even without any apparent perforation.

Milleporite. Fossil millepores.

Mind. An essential element in the composition of every animal. Though it can neither prevent the existence or change the characters of *matter*, *motion*, or *sensation*, (the other essential elements,) it takes cognizance of causes, and provides for consequent effects, before the other elements can obey its behests.

"Of the connection of mind with the organs which it commands," says Mr. Newman, "we know nothing: mind itself is only known by its effects; its commands are carried by the nerves, — a fact ascertained by separating a nerve, after which separation, the mind no longer controls the parts to which that nerve extended its branches." (See *Nerves*.)

Miniatous. Of the color of red lead.

Miocene. The tertiary period, in which a small portion of fossil shells are of the recent species.

Molares Dentes. The molar teeth, or grinders.

Molares Glandulæ. The molar glands: two salivary glands situated on each side of the mouth, the excretory ducts of which open near the last molar tooth.

Molecule. The smallest particle into which a mass can be conceived or divided.

Molecules. Microscopic particles.

Molehill. A little hillock or elevation of earth thrown up by moles working underground.

Molluscous. Pertaining to, or partaking of, the properties of the class of animals termed *Mollusca*, which form the primary division of the animal kingdom.

Momentum. The quantity of motion in a moving body.

Monad. The genus of the most minute and simple microscopic animalcules, which are shaped like spherical cells.

Mongrel. An animal of a mixed breed.

Moniliform (*antennæ*). Having each joint oval or globose, resembling a necklace.

Monocular. Having but one eye.

Monocule. An insect with only one eye.

Monodactylous. Having one finger or toe only.

Monogamous. Living with one mate or partner; opposed to *polygamous*.

Monograph. An account or description of a single thing or class of things.

Monomerous. A term denoting that the trunk of an insect has no suture or segment; or that the *trochanter* consists of only one joint.

Monomyary. A bivalve whose shell is closed by one adductor muscle.

Monothalamous. One-chambered; an epithet applied to shells when the chamber is not divided by partitions.

Monster. An animal produced with a shape or parts that are not natural.

Morphological. Relating to the modifications of form which the same organ undergoes in different animals.

Mortal. Subject to death; destructive to life.

Moschate. Having a scent resembling musk.

Moss-clad. Covered or overgrown with moss.

Motatorious. Pertaining to the motatorii, those legs which, when an insect is at rest, are in a perpetual vibratory motion.

Motory (*nerves*). The nerves which control motion.

Mottled. Clouded or spotted with various colors.

Mouse-colored. Black, with a small proportion of yellow: the color of the common mouse.

Mucilage. The liquor which moistens and lubricates the ligaments and cartilages of the articulations or joints in animal bodies.

Mucilaginous. Moist, soft, and lubricous; partaking of the nature of *mucilage*.

Mucro. A short, stout, sharp-pointed process.

Mucronate. Ending in a sharp, rigid point.

Mucronate (antennæ). When they terminate in a short point or mucro.

Mucus. A viscid fluid secreted by the *mucous membrane*, which it serves to moisten and defend. It covers the lining membranes of all the cavities which open externally, as the mouth, nose, lungs, intestinal canal, urinary passages, &c. The word *mucus* is also sometimes applied to other animal fluids of a viscid quality, as the synovial fluid which lubricates the joints.

Mulatto. The offspring of a negress by a white man, or of a white woman by a negro.

Multangular. Having many angles.

Multiarticulate. Consisting of many joints.

Multicavous. Having many holes or cavities.

Multifid. Cleft into many divisions by linear sinuses.

Multiform. Having many shapes, forms, or appearances.

Multigenerous. Consisting of many kinds.

Multilocular. Having many cells or chambers: consisting of several divisions.

Multiparous. Producing many at a birth.

Multiparite. Divided into more than four parts.

Multisect. When an insect appears to have no distinct trunk or abdomen, but is divided into numerous segments.

Multivalve. A shell composed of many pieces or valves.

Multivalvular. Having many valves.

Multocular. Having many eyes.

Muricate; Muricated. In insects, when the surface is covered with sharp, thick, but not close, elevated points or pustules. In shells, when clothed with sharp spines.

Murine. Pertaining to the genus *Mus.*

Muscle. An animal tissue composed of little bundles of fibres, inclosed in a thin circular membrane, and serving as the organs of motion.

Muscular Impressions. The marks or indentations in the shells of acephalous bivalves, which indicate the insertion of the muscles, by which the animal is attached to its shell.

Musteline. Pertaining to the weasel, or animals of the genus *Mustela.*

Mutilate. When the base-covers of an insect appear unnaturally short or curtailed, as if mutilated.

Mutilated. Deprived of a limb or some essential part.

Muzzle. The mouth and parts immediately adjacent to it.

Myelencephala. The primary division of animals characterized by a brain and spinal marrow.

Myography. A description of the muscles.

Myriad. An immense bnt indefinite number.

Myriapod. Having two hundred legs or more; an insect belonging to the order *Myriapoda*, which are characterized by their numerous feet.

Mytilite. A petrified shell of the genus *Mytilus.*

N.

Nacre. Mother-of-pearl; the white, shining substance which constitutes the interior surface of a shell producing a pearl.

Nacred; Nacreous. Having a pearly lustre; like mother-of-pearl.

Nascent. Beginning to exist or to grow; coming into being.

Natant. Swimming, or floating on the water.

Natatorious. When the legs of insects are compressed and ciliated, and formed for swimming. Also, when the abdomen is terminated by flat foliaceous appendages, or the tail is ciliated on each side with dense parallel hairs, which assist the insect in *swimming.*

Natatory. Formed for swimming; enabling to swim.

Natural. Produced by, or derived from, natnre.

Naturalist. One tbat is versed in Natural History.

Nature. This word is variously used in works on Natural History. It sometimes denotes the qualities which a being derives from birth, in opposition to

those which it may owe to art; at other times, the aggregate of beings which compose the universe; and sometimes, again, the laws which govern these beings. In this latter sense, it has become customary to personify Nature, and to employ the name for that of its Great Author.

Nautilite. A fossil nautilus.

Navicular. When two sides meet and form an angle like the *outer* bottom of a boat; boat-shaped.

Necromorphia. Insects in which the pupa has the mouth and organs of locomotion detached from the body, but so enveloped in a case or sheath that it can employ neither This group contains the *Hymenoptera* and *Coleoptera*.

Nectareous. Resembling nectar; very sweet and pleasant.

Negro. A native or descendant of the black race of men in the more southern parts of Africa.

Neigh. To utter a sound, like the horse, expressive of want or desire.

Nematoidea. The intestinal worms, which are long and filiform.

Nematoneura. A name applied to the higher division of Cuvier's *Radiata* by Professor Owen.

Neologist. One who introduces or employs new words in any science.

Nerves. The nerves are the organs of sensation: they originate in the brain, and are prolongations of the medullary substance of the brain, which ramify and extend over the whole body; and they consist of fine tubular filaments, which are arranged nearly parallel to sheaths of fibrous tissue.

Nervures. The delicate framework of the membranous wings of insects.

Neurilemma. The membrane which surrounds the nervous fibre.

Neurology. The science of the nervous system, or a description of the nerves.

Neuropterous. Belonging to the *Neuroptera*, an order of four-winged insects characterized by their numerous nervures, like those of the dragon-fly.

Neurose. Wings of insects that have nervures besides the marginal ones.

Neurotomy. The art or practice of dissecting the nerves.

Nibble. To bite at; as, fishes *nibble* at the bait. A little bite, or seizing to bite.

Nictating (*membrane*). The thin membrane that covers and protects the eyes of some animals, without entirely obstructing the sight.

Nidamental. Relating to the protection of the egg and young, especially applied to the organs that secrete the material of which many animals construct their nests.

Nidification. The act or operation of building a nest, and the hatching and feeding of young in the nest.

Nidulation. The time of remaining in the nest.

Nidus. A nest or repository for the eggs of birds, insects, &c.

Noctidial. Comprising a night and a day.

Noctilucous. Shining in the night.

Noctivagant. Wandering or prowling about by night.

Nocturnal. Pertaining to the night; as the *nocturnal* habits of certain animals which usually come forth from their retreats and obtain their prey during the night.

Nodose. Having one or more knobs or swellings. The word *Nodose* is also applied to the *antennæ* of insects when they have one, two, or more joints larger than those which precede or follow them.

Nodular. Pertaining to or resembling a nodule, or little knotty lump.

Nodule. A little knot-like eminence.

Nomadic. Wandering for the sake of pasturage; pertaining to a pastoral life, and roving from place to place with herds of cattle.

Nomenclature. The names of things which are appropriated to any branch of science.

Nonage. Under adult age.

Nondescript. Any thing that has not been described. Thus an animal newly discovered is called a *nondescript*.

Non-fossiliferous. Not producing fossils; of a nature not to convert into fossils.

Normal. According to rule; natural.

Nostrils (of birds) are said to be *linear* when they are extended lengthwise in

a line with the bill, as in divers, &c.; *pervious*, when they are open, and may be seen through from side to side, as in gulls, &c.

Notal. Belonging to the back.

Nucleated. Having a nucleus or central particle; applied to the elementary cells of animal tissues, the most important properties of which reside in the nucleus.

Nudibrachiata. The Polypes whose arms are not clothed with vibratile cilia.

Nudibranchiata. An order of Gasteropods in which the gills are exposed.

Nummulite. Fossil remains of a chambered shell of a flattened form, formerly mistaken for money.

Nutrient. Nourishing; producing growth.

Nymph. The pupa, or chrysalis; the second state of an insect, passing to its perfect form.

O.

Obese. Unnaturally large and distended, as if from disease or too much food.

Oblique. Running sideways: when the longitudinal line is cut through at *acute* angles.

Obliterate. A term in entomology applied to impressions and elevations when almost effaced.

Oblong. Longer than broad: the *longitudinal* diameter being *more* than *twice* the length of the *transverse*, and the ends varying, or rounded.

Oblong-ovate. Between oblong and egg-shaped.

Obscure. A surface which reflects the light but little.

Obsolete. Partially indistinct; not well defined; not fully developed; as the joint striæ on certain shells.

Obtruncated. Lopped off; deprived of a limb.

Obtuse. Blunt; not pointed or acute; dull; obscure: terminating bluntly, but within the segment of a circle.

Obumbrant. When the scutellum of an insect overhangs the metathorax.

Obverse. When an object is viewed with its *head* towards you.

Occiput. That part of the skull which forms the hind part of the head.

Ocellated. A term applied to eye-like spots; formed with the figures of little eyes.

Ocellus. An eye-like spot in the *wings* of many Lepidoptera, and consisting of annuli of different colors, inclosing a central spot or pupil. *Blind Ocellus* is one without the pupil. *Spurious Ocellus*, a circular spot without any defined iris or pupil. *Simple Ocellus*, when the ocellus consists only of iris and pupil. *Compound Ocellus*, when it consists of three or more circles. *Nictitant Ocellus*, when the ocellus includes a tumular spot of a different color. *Fenestrate Ocellus*, when an ocellus has a transparent spot. *Dioptrate Ocellus*, a fenestrate ocellus divided by a transverse line. *Double Ocellus*, when two ocelli are included in the same circle or spot; and when such ocelli join each other they are termed *twin* ocelli. *Sesquialterous Ocellus*, an ocellus with a smaller near it. The *simple eyes* of insects are small, transparent, semi-globular lenses, generally three in number, and arranged in a triangle on the crown of the head. Though their use has never been satisfactorily proved, enough has been ascertained for entomologists to agree in considering them organs of vision. The eyes of larvæ, spiders, and some other Annulosa are simple ocelli, arranged in groups. They are also called *stemmata*.

Ochraceous. Of a dull brownish-yellow color; approaching to the color of ochre.

Octodentate. Having eight teeth.

Octofid. In entomology, separated into eight segments.

Octonocular. Having eight eyes.

Octopod. Having eight legs.

Octoradiated. Having eight rays.

Oculi (*oculus*). The eyes of insects are generally *composite*, i. e. formed of facets or minute lenses, which are hexagonal, and vary from fifty to twenty thousand in a single eye; every one of them receiving the image of an object, and appearing to correspond with the crystalline lens of the human eye.

Oculiform. Shaped like the eye.

Odoriferous. Diffusing fragrance.

Œsophageal. Pertaining to the gullet.

Œsophagus. The anterior extremity of the alimentary canal; the gullet.

Officinal. Pertaining to drugs, perfumes, &c., usually kept in apothecaries' shops.

Oleaginous. Unctuous; having the qualities of oil.

Olfactory. Relating to the sense of smelling; as *olfactory* nerves.

Olivaceous. Dull olive-green, or green tinged with brown.

Olive. A brownish green, the color of olives.

Omnigenous. Consisting of all kinds.

Omnivorous. Feeding indiscriminately or subsisting on all kinds of food.

Onychotenthis. The genus of Calamaries armed with hooks or claws.

Oolite. Egg-stone; an extensive group of secondary limestones composed of rounded particles, like the roe or eggs of a fish.

Opalescent. Reflecting a colored lustre from a single spot.

Opaline. A bluish white reflecting the splendor of the opal.

Opaque. Impervious to the rays of light; not transparent; a surface which does not reflect the rays of light at all.

Operculate. When the eyes of insects are covered by an operculum.

Operculated. Furnished with a lid or cover.

Operculum. A lid or cover; applied to the horny plate which closes certain univalve shells; also to the covering of the gills in fish.

Ophidian. Resembling or pertaining to serpents; designating an order of vertebrate animals destitute of feet and fins.

Ophiologist. A person versed in *ophiology*, or the natural history of serpents.

Ophiology. That part of Natural History which treats of serpents.

Ophiomorphous. Having the form of a serpent.

Ophiophagous. Eating or feeding on serpents.

Orange. A color composed of equal parts of red and yellow.

Orbicular. Spherical; in the form of an orb.

Orbiculate. A depressed globe, whose *horizontal* section is circular, and *vertical* oval.

Orbit. The skin which surrounds the eye. It is generally bare, but particularly in the parrot and the heron.

Orbital. Pertaining to the orbit of the eye.

Order. A subordinate division of the animal kingdom, bearing the same relation to a *class* which this latter does to a kingdom; so that a class is made up of orders, in the same manner as a kingdom is made up of classes.

Ordinate. When spots, puncta, &c. are placed in *rows:* thus we say ordinato-punctate, ordinato-maculate, &c.

Organ. A natural instrument of action or operation, or by which some process is carried on.

Organic Bodies. Such as possess organs, on the action of which depend their growth and perfection; as in the case of animals and plants.

Organic Remains. All animal and vegetable substances which are dug out of the earth in a fossilized state.

Organization. Structure; suitable disposition of parts which are to act together in a compound body.

Organology. That branch of physiology which specially treats of the different organs of animals, but more particularly those of the human species.

Orichalceous. A splendor intermediate between that of *gold* and *brass.*

Orifice. An opening; the mouth or aperture of a tube or other cavity.

Ornitholite. A petrified bird.

Ornithologist. A person who is skilled in the natural history of birds, who understands their form, structure, habits, and uses.

Ornithology. The science which teaches the natural history and arrangement of birds; or, to use the definition of Cuvier, of vertebrated oviparous animals, with a double circulation and respiration, organized for flight.

Orthocera. Extinct Cephalopods which inhabited long, conical, chambered shells, like a straight horn.

Orthoceratite. The name of certain fossil univalve shells, straight, or but slightly curved, arranged by Cuvier in the genus Nautilus.

Orthopterous. Belonging to the *Orthoptera*, an order of insects with elytra and longitudinally folded wings.

Oryctography. That part of Natural History in which fossils are described.

Oryctology. That part of physics which treats of fossils.

Osseous. Bony.

Ossification. Change from a soft animal substance into bone, or into a substance as hard as bone.

Ossivorous. Feeding on bones.

Osteological. Pertaining to a description of the bones.

Ostracite. An oyster-shell in its fossil state; or a stone formed in the shell, the latter being dissolved.

Oval. Having the *longitudinal* diameter *twice* the length of the *transverse*, and the ends circumscribed by equal segments of a circle.

Ovaliform. Having the *longitudinal* section oval, and the *transverse* circular.

Ovarious. Consisting of eggs; as *ovarious* food.

Ovary; Ovarium. That part of a female animal in which the eggs are formed or lodged; or the part in which the fœtus is supposed to be formed.

Ovate. Shaped like the longitudinal section of an egg.

Ovate-oblong. Oblong in the shape of an egg, or with the end lengthened.

Ovate-subulate. Having something of the form of an egg and an awl, but most tending to the latter.

Ovicular. Pertaining to an egg.

Oviduct. A passage for the egg from the ovary.

Oviform. Egg-shaped; having the form or figure of an egg.

Ovigerous. A term applied to the parts containing or supporting eggs.

Ovine. Pertaining to sheep.

Oviparous. That mode of generation which takes place by the exclusion of the germ from the body, in the form of an egg, and which is hatched after such exclusion.

Oviposition. The act of excluding eggs from the abdomen, as an insect.

Ovipositor. The organ in insects, which is often large and complicated, for the transmission of the eggs, during exclusion, to their appropriate place.

Ovoid. Approaching to the shape of an egg.

Ovoviparous. A term denoting that the eggs are hatched within the body of the animal, and that the young are excluded alive. The *marsupial* animals are examples of ovoviparous mammiferous quadrupeds; and the viper, rattlesnake, and lizard among *reptiles*.

P.

Pabular; Pabulous. Affording food or aliment.

Paçhydermatous. Having a thick skin; an epithet applied to an order of animals, called *Pachydermata*, embracing all the hoofed quadrupeds which do not ruminate.

Palæontographical. Pertaining to the description and illustration of fossil organic remains.

Palæontology. The history of ancient extinct organized beings.

Palæozoic. A term to denote those rocks which contain the fossil remains of the earliest inhabitants of the globe. They are divided by geologists into the Cumbrian, Silurian, and Devonian systems.

Palatal. Pertaining to the palate.

Palate. The roof or upper part of the mouth.

Palatiform. When the tongue of an insect forms the inner surface of the *labium*, but is not separate from it.

Paleous. Resembling chaff.

Palleal. Pertaining to the mantle of the Mollusca.

Palleal Impression. The mark or groove formed in a bivalve shell by the muscular attachment of the mantle, which, being always found near the margin of the shell, is sometimes termed the *marginal* impression.

Palmated. Entirely webbed; as the *palmated* feet of certain aquatic birds.

Palmiped. Relating to the *Palmipedes*, an order of birds having the toes connected by a web or membrane, and thus the feet fitted for swimming.

Palpi. The organs of touch developed from the maxillæ and labium of insects.

Palpiform. Resembling in shape the palpi or feelers of insects.

Papaverous. Of the nature or quality of poppies.

Papillæ. Small dots or soft eminences, generally adapted for delicate sensation.

Papillary; Papillous; Papillose. Having the surface covered with dots, pimples, or small tubercles.

Papillulate. Beset with many papillules.

Papillule. A tubercle or variole with an elevation in its centre.

Papyraceous. Of the consistency of paper.

Parallelism. Resemblance, equality of state.

Parasitic; Parasitical. Existing on or inhabiting some other body.

Parenchyma. A spongy substance contained in the interstices between the bloodvessels of the viscera.

Parenchymous. Spongy, soft, porous.

Parietal (bones). The bones which form the sides and upper part of the skull.

Parotid. Denoting certain salivary glands below and before the ears, or near the articulation of the lower jaw.

Paroxysm. An exasperation or exacerbation of a disease.

Partite. Divided to the base.

Passerine. Pertaining to the *Passeres*, the order of birds to which sparrows belong.

Pasture; Pasture Land. Ground covered with grass appropriated for the food of cattle.

Patellate. Dilated and shaped something like a *patella* or platter.

Patelliform. Shaped like a dish.

Pateriform. When the joints are somewhat dilated and very short, shaped something like a shallow bowl.

Pavonine. Resembling the tail of a peacock.

Peahen. The hen or female of the peacock.

Pectinal. Pertaining to a comb.

Pectinated. Resembling the teeth of a comb.

Pectinibranchiata. The order of Gasteropods in which the gills are shaped like a comb.

Pectiniform (antennæ). When the joints are furnished on one side with slender processes resembling the teeth of a comb.

Pectoral. Pertaining to the breast; as the *pectoral* muscles. The *pectoral* fins of a fish are situated on the sides of the fish, behind the gills.

Pectunculate. A term applied to the maxillæ of insects, when the stipes below the feeler has a row of minute spines set like the teeth of a comb.

Pedicle. The support of the *Lepas anatifera* and its corresponding species, by which they are attached to wood, &c.

Pediform. Shaped like a foot.

Peduncle. A footstalk or tube on which any thing is situated.

Pedunculated. Attached to external objects by a hollow fleshy tube, called the peduncle. The term *pedunculated* is also applied to insects when they have the sixth segment slender and thread-like, as the wasp, &c.

Pelagic; Pelagian. Belonging to the deep sea; as, *pelagian* shells.

Pellicle. The skin or film.

Peltate. Shield-shaped; orbicular and attached by a central pedicle.

Pelvis. The lower part of the abdomen.

Pendulous. Hanging; fastened at one end, the other swinging; as, the dewlap of an animal.

Pencil. A small bundle of diverging hairs.

Penicillate. An epithet for a part which supports bundles of diverging hair.

Pensile. Hanging; suspended.

Pentacrinite. A pedunculated star-fish with five rays: they are for the most part fossil.

Pentangular. Having five corners or angles.

Percolated. Filtered; passed through small interstices.

Perennibranchiate. Relating to a family of reptiles (the *Protei*, *Sirens*, &c.) which are organized to live either on land or in water, by possessing at the same time both lungs and gills.

Perforatæ (antennæ). When a portion of each joint is dilated and flattened, and the remaining portion, being cylindrical, appears like a thread on which the dilated parts are strung.

Perforated. Having holes, as if bored by a sharp instrument.

Pergameneous. Of the texture of parchment: a thin, tough substance, in texture resembling parchment.

Pericardium. The membranous bag which surrounds the heart, and the arterial and venous trunks connected with it.

Pericranium. A membrane covering the outside of the cranium, and corresponding to the periosteum of other bones.

Periosteum. A nervous vascular membrane immediately investing the bones of animals.

Periostracum. The membrane analagous to scarfskin which covers shell.

Peristaltic. The vermicular contractions and motions of muscular canals, as the alimentary and the circulating tubes. The peristaltic motion of the intestines is performed by the contraction of the circular and longitudinal fibres composing their fleshy coats, by which the chyle is driven into the orifices of the lacteals, and the excrements are protruded towards the anus.

Peritoneal. Belonging to the peritoneum.

Peritoneum. A thin, smooth, lubricous membrane investing the whole internal surface of the abdomen, and, more or less completely, all the viscera contained in it.

Peritrema. The raised margin which surrounds the breathing-holes of scorpions.

Petaloid. Having the form of petals.

Petiolate. Supported or suspended by a slender stalk.

Petrescence. The process of changing into stone.

Petrifactive; Petrific. Having power to convert animal or vegetable substances into stone.

Pharyngeal; Pharyngal. Belonging to the *pharynx.*

Pharynx. The opening into the gullet.

Phenomenon (pl. *Phenomena*). Any thing which has existence in the natural world; as, the *phenomena* of heat, the *phenomena* of the heavenly bodies, or of terrestrial substances.

Phocenic. Appertaining to the dolphin.

Phosphorescent. Shining in the dark, like the glowworm.

Physiological. Relating to the properties and functions of living beings.

Phytivorous. Feeding on plants and herbage.

Phytophagous. Feeding on plants.

Piceous. Shining reddish-black, the color of pitch.

Pilose. Covered with a thick down.

Pinion. To confine by binding the wings. The joint of a fowl's wing, remotest from the body.

Pinnate. Shaped like a feather, or provided with fins.

Pinnatifid Fin-footed; having the toes bordered by membranes.

Pisciform. Having the shape of a fish.

Pisiform. Having the form of a pea.

Pistillaceous. Growing on the germ or seed-bud of a flower.

Pituitous. Consisting of mucus, or resembling it in qualities.

Placenta. The substance that connects the fœtus to the womb, and by which the circulation is carried on between the parent and the fœtus.

Placental. Pertaining to the substance that connects the fœtus to the womb.

Plane. Perfectly level. When there is neither elevation nor depression.

Planorbicular. Flat and circular.

Plano-subulate. Smooth and awl-shaped.

Plantigrade. When the whole or part of the sole of the foot is placed flat on the ground in walking, as is the case with certain carnivorous Mammalia.

Plasma. The *liquor sanguinis*, or fluid part of the blood, in which the red corpuscles float.

Plastron. The under part of the shell of the crab and tortoise.

Pleiocene. The more recent tertiary strata, in which the major part of the fossil Testacea belong to recent species.

Pleistocene. The newest of the tertiary strata, which contains the largest proportion of living species of shells.

Plexiform. In the form of network; complicated.

Plexus. A bundle of nerves or vessels interwoven or twined together.

Plicæ. Folds of membrane.

Plicate; Plicated. Plaited; folded like

a fan: applied to spiral plaits on the columella of some shells; also to the angular bendings in the margins of some bivalve shells.

Plumbeous. The color of lead.

Plumiped. Having feet covered with feathers.

Plumulose. When the hairs branch out laterally like feathers.

Plumose. Featbery; like a plume of featbers; or, having hair of a feathery appearance.

Pneumatic. Belonging to the air and air-breathing organs.

Podeon. The sixth segment in insects.

Podophthalma. The tribe of Crustacea in which the eyes are supported upon stalks.

Pollen. In botany, the fecundating dust, or farina, contained in the anther of flowers, which is dispersed on the pistil for impregnation.

Polliniferous. Producing pollen.

Pollinose. Covered with a loose, mealy, and often yellow pollen, resembling the pollen of flowers.

Polygamous. Not confined to one mate, but pairing promiscuously; as is common with certain birds.

Polygastria. The class of infusorial animalcules which have many assimilative sacs or stomachs.

Polygenous. Consisting of many kinds.

Polymorphous. Having many forms.

Polyphagous. Feeding indiscriminately; all-devouring.

Polypi. The class of radiated animals whicb have many prehensile organs radiating from around tbe month.

Polythalamous. Divided into several chambers.

Porcate. In entomology, a term denoting the presence of several parallel elevated longitudinal ridges.

Porcellaneous. Pertaining to or resembling porcelain; as, *porcellaneous* sbells.

Porcine. Pertaining to swine.

Pore. A minute interstice in the skin of an animal, through which the perspirable matter passes to the surface, or is excreted.

Porrected. When the head is prominent and elongate.

Postdiluvial; Postdiluvian. Living or happening posterior to the universal deluge.

Posterior. The hind limbs, &c. The side in bivalve shells opposite to that in which the ligament is placed.

Postorbital. Pertaining to whatever is situated behind the orbits.

Postscutellum. The fourth section of the upper surface of each segment in insects.

Præscutum. The first section of the upper surface of each segment in insects.

Præsternum. The name of the plate nearest the head in the lower surface of each segment in insects when it is divided into four plates.

Prasinous. Green with a mixture of yellow.

Precipitous. Very steep; as a *precipitous* hump on the back of an animal.

Predatory. Plundering; practising rapine.

Preen. To clean and dress the feathers, as birds, to enable them to glide more easily tbrough the air or water.

Prehensile. Seizing; grasping; as, the tails of some monkeys are *prehensile.*

Premorse. Terminating in an irregular truncate apex, as if bitten off.

Preternatural. Beyond the ordinary rules of nature, or different from what is *natural*, but not supernatural.

Pretypify. To prefigure.

Primaries, or *Primary Quills.* The largest feathers of the wings; they rise from the first bone.

Primitive. Original; primary; not derived.

Primordial. Existing from the beginning.

Prismoidal. Having more than *four* sides, and whose *horizontal* section is a polygon.

Proboscidiform. Applied to any elongated appendage about the head.

Proboscis. The name given to the flexible muscular tube, or prehensile organ formed by the prolongation of tbe nose, as is seen in the elephant. It is also an entomological term: the proboscis of insects being used by some to suck the juice from plants, and by others to suck the blood from animals.

Process. Series of motious or changes in growth, decay, &c. in physical bodies; as, the *process* of decomposition. It is also used to denote any natural appendage or adnascent part of an animal for which there is no definite name.

Procreate. To engender and produce.

Procreative. Having the power to beget.

Producted. Disproportionately long.

Progeny. Descendants of the human kind, or of animals in general.

Projectile. A body impelled forward by force.

Prolapse. To fall down or out.

Prolegs. The wart-like tubercles which represent legs on tbe hinder segment of caterpillars.

Prone. When an object lies upon its belly.

Pronotum. Tbe upper surface of the *prothorax.*

Propedes. The forelegs of insects.

Propodeon. The fifth segment in insects.

Prosternum. The under surface of the *prothorax.*

Prostrate. Lying with the body extended on the ground or other surface.

Protelum. The eleventh segment in insects.

Prothorax. The first of the three segments which constitute the thorax in insects.

Protruded. Tbrust forward or out.

Protuberance. Any thing swelled or pushed beyond the surrounding surface; as, a swelling or *protuberance* on any part of the body.

Pruinose. When the splendor of the surface is somewhat obscured by the appearance of a bloom upon it, like that of a plum, but which cannot be detached.

Pruriginous. Having tendency to itch.

Pseudo-morphous. Not having the true form.

Psychical. Relating to the phenomena of the soul, and to analogous pbenomena in the lower animals.

Pteropodous. Pertaining to the *Pteropoda*, an order of the class Mollusca whose organs of locomotion consist of a pair of wing-shaped fins.

Puberty. The age at which animals are capable of procreating and bearing young.

Pubescent. Covered with very fine decumbent short hairs.

Pulmograde. The tribe of Medusæ which swim by contractions of the pulmonary disc.

Pulmonary. Pertaining to the lungs; affecting the lungs.

Pulmonata. The order of Gasteropods that breathe by lungs.

Pulverous; Pulverulent. Consisting of dust or powder.

Pulvilli. The soft cushions on the under surface of the joints of the tarsus in some insects.

Pulvinate. When, in consequence of the prothorax being depressed in one place, it seems to puff out in another.

Pulvinuli. A soft ball which some insects have at the end of the tarsi.

Punctate; Punctated. Full of small holes, or beset with many points.

Puncto-striated. When the longitudinal impressed lines are punctured.

Punctulated. When the surface bas the appearance of having been thickly punctured with a pointed instrument, but which has only made impressions on it.

Punctured. Pierced with a sharp point.

Pupa. An insect in the second stage of its metamorphosis. It is synonymous with *aurelia* or *chrysalis*, — words formerly in more general use than they are at present.

Pupil. A little aperture in the middle of the iris and urea of the eye, through which the rays of light pass to the crystalline humor, to be painted on the retina. The central spot on the *ocellus* in the wings of many Lepidoptera. It is called a *hastate pupil* wben the pupil is a halberd-shaped spot, and a *suffulated pupil* when tbe pupil shades into another color.

Pupiparous. Pertaining to insects which bring forth their young in the pupa state.

Pupivorous. Feeding on the larvæ and cbrysalids of insects.

Purple. A color composed of red and blue blended.

Purpurescent. Inclining to a purple color.

Purulent. Consisting of or resembling pus or matter.

Putrescent. Pertaining to the process of putrefaction.

Pylorus. The aperture which leads from the stomach to the intestine.

Pyramidal. Whose *vertical* section is triangular, and *horizontal* quadrangular.

Pyriform. Pear-shaped.

Q.

Quadrate. To agree or correspond with. Square. Quadrilateral, with the sides *equal* and the angles *right* angles.

Quadrennial. Occurring once in four years.

Quadriarticulate. Consisting of four joints.

Quadridental. Having four teetb.

Quadrifid. Cleft in four parts.

Quadripartite. Consisting of four corresponding parts.

Quadriplicated. Having fonr plaits or folds.

Quadrivalvular. Having four valves.

Quadrumanous. Having four hands.

Quadruped. Having four legs and feet. An animal having four legs and feet, as a horse, a lion, &c.

Quarry. In falconry, the game which a hawk is pursuing or has killed. Among bunters, a part of the entrails of the beast taken, given to the bounds.

Quiescent. Being in a state of repose.

R.

Race. A particular breed.

Racemous. Growing in racemes or clusters.

Radial. Pertaining to the radius or to the fore-arm of the human body; as, the *radial* muscles.

Radiata. Animals in which the organs of sensation and motion are disposed like rays round a centre; the lowest primary division of the animal kingdom.

Radiate. When a dot, spot, &c. appears to send forth rays, as the large blue area common to all the *wings* of *Papilio Ulysses.*

Radiated (areolets). When the areolets are chiefly formed by radiating longitudinal nervures.

Radicated (shell). When fixed by the base to anotber body.

Radius. In entomology, a single subdivision of a *digitate* wing; i. e. when the wings are cleft to the base into several subdivisions.

Ram. The male of the sheep or ovine genus.

Ramification. A shooting out into branches.

Ramify. To shoot into branches.

Ramose. Spread out into branches. *Antennæ* are so called wben setaceous or moniliform, but having long branches from several of the joints.

Rapacious. Subsisting on prey or animals seized by force.

Rarefy. To make tbin and porous, or less dense.

Reanimate. To resuscitate; to restore to life and action.

Reclined. Leaning towards any thing as if to repose upon it.

Recondite. Wben the head of an insect is wbolly covered and sheltered by the shield of the thorax.

Recrement. Superfluous matter separated from that which is nseful.

Recrementitious. Consisting of superfluous matter separated from that which is valuable.

Rectangular. Having right angles.

Rectum. Tbe third and last of the large intestines.

Recumbent. Leaning or reposing upon any tbing.

Recurrent. When a nervnre, or a branch of it, after running towards the apex of the wing, turns back and runs towards the base.

Recurved; Recurvated. Turned or curved outwards.

Recurvirostral. Pertaining to those birds whose beak or bill bends upwards

Refracted. Abruptly bent, as if broken.

Reflected. Bent back or thrown back wards.

Reflex; Reflexed. Turned or bent back or upwards.

Refluent. Flowing back; as, refluent blood.

Refrigerate. To allay the heat of; to refresh.
Region. A large tract or space of country.
Regurgitated. Swallowed a second time; thrown or poured back.
Remasticate. To chew over and over, as in chewing the cud.
Renascent. Springing or rising into being again.
Reniform. Kidney-shaped.
Reniculus. A small kidney-shaped spot, as seen in the wings of some nocturnal Lepidoptera.
Rennet. The concreted milk found in the stomach of a sucking quadruped, particularly of the calf.
Repand. Cut into very slight sinuations, so as to run in a serpentine direction.
Repletion. Superabundant fulness.
Replicated. Folded or plaited, so as to form a groove or channel.
Reptilia. The class of vertebrate animals with imperfect respiration and cold blood. They constitute an order of the class *Amphibia*, including all such as are furnished witb limbs or articulated extremities, as tortoises, lizards, and frogs.
Resilient. Leaping or starting back; rebounding.
Resplendent. Reflecting the light intensely.
Resupine. When an object lies upon its back.
Rete Mucosum. The cellular layer between the true skin and the scarfskin, which is the seat of tbe peculiar color of the skin.
Reticulate; Reticulated. Formed like a piece of network; having distinct veins or lines which intersect each other in various directions, like the meshes of a net. Applied to tbe areolets of insects, when they are extremely small and infinitely numerous.
Retiform. Composed of crossing lines and interstices; as, the *retiform* coat of the eye.
Retracted. When the head of an insect is wholly withdrawn within the trunk.
Retractile. Capable of being drawn backwards. The claws of the cat tribe. When an insect can at pleasure exsert its head or withdraw it witbin the trunk.
Retroflected. Bent backwards.
Retrograde. Going or moving backwards.
Retromingent. Discharging the urine backwards.
Retrorse; Retrorsed. Bent back.
Retuse. Ending in an obtuse sinus; as, wben the inner wborls of a spiral shell appear to have been pressed into the body of tbe shell, and the apex is below the level of the last whorl.
Reverse. When an object is viewed with its anus towards you.
Reversed. The spire of a shell is said to be *reversed* or *sinistral*, when the volutions turn to the *left*, or the opposite way to that of a common corkscrew.
Revivescent. Regaining, or restoring, life and action.
Revolute. Rolled outwards or backwards.
Rhombiform. When the horizontal section is rhomboidal.
Ribbed. Having longitudinal or transverse ridges.
Rigid. Hard and stiff, so as not to bend or yield to pressure.
Rima. A chink or interstice.
Rimose. When any surface possesses numerous minute narrow excavations, running into each other; chinkly, like the bark of a tree.
Rivose. When furrows do not run in a parallel direction and are rather sinuate.
Rorulent. Covered like a plum with a bloom which may be rubbed off.
Rostrate. When the anterior part of an insect's head is elongated and attenuated into a cylindrical or many-sided rostrum or beak.
Rostrum (of a sbell). The beak, or its extension, where the canal is situated.
Rotatory. When a body or a part of it turns wholly round, or describes a circle.
Rotifera. The name of tbe class of infusorial animals, characterized by the vibratile and apparently rotating ciliary organs upon the head.
Rotund. Round, circular, spherical.
Rotundate; Rotundated. Blunted or

turned at the edge; terminating in the segment of a circle.
Rubefacient. Making red.
Rubescent. Growing or becoming red.
Rubicund. Inclining to redness.
Rubineous. The red splendor of the ruby.
Rudiment. An imperfect organ, or one but partially developed.
Rudimentary. Small; imperfect; undeveloped.
Ruff. A tuft or collar of raised feathers round the neck of certain birds.
Rufescent. Tinged with red.
Rufous. A pale red. Of a reddish or dull copper color.
Rugged. When a surface is rough, as in certain insects with spines and tubercles intermixed.
Rugose. Rugged; wrinkled. Intricate, with approximating elevations and depressions whose direction is indeterminate.
Ruminant. Chewing the cud: having the property of again chewing what has once been swallowed. The Ruminantia or *ruminating animals* are the cloven-hoofed quadrupeds, as oxen, sheep, deer, goats, hares, and squirrels. Rumination consists in a power of laying aside the food for a time, in a receptacle adapted for it, and afterwards bringing it back into the mouth and masticating it a second time.
Ruminate. To chew the cud.
Russet. Of a reddish-brown color and rough, like the skin of the apple called a *russet* or *russeting.*
Rutting Season. A term used to denote the time of the year when animals of the cervine genus follow the natural instinct to copulate.

S.

Sabulous. Sandy; gritty.
Sacciform. Shaped like a sac or bag.
Salacious. Lustful; having a strong propensity to venery.
Salient. Moving by leaps, as frogs.
Saline. Partaking of the qualities of salt.
Saliva. The fluid which is secreted by the salivary glands; it serves to moisten the mouth and tongue, and also to promote digestion.
Salivary. Secreting or conveying saliva; as, the *salivary* glands.
Saltatorious. When the ventral segments or the anus (of an insect) are furnished with elastic processes which enable the animal to leap.
Salubrious. Healthful; as, a *salubrious* climate.
Sanative. Having the power to heal or cure.
Sanguifluous. Flowing with blood.
Sanguineous. Of the color of blood or resembling blood.
Sanguivorous; Sanguinivorous. Eating or subsisting on blood.
Sarcophaga. Flesh-eating animals.
Sarcophagous. Pertaining to those animals which subsist by eating flesh; feeding on flesh.
Saurian. The epithet by which reptiles belonging to the *lizard* tribe (*Lacerta*) are distinguished.
Sauroid. An epithet used to distinguish a group of fossilized fishes of the carboniferous and secondary formations.
Saxatile. Living among rocks.
Scabious. Rough from the effects of the scab or mange.
Scabrous. Rough and rugged; rough to the touch from granules scarcely visible.
Scalloped. Indented at the edges.
Scapular. Pertaining to the shoulders or the shoulder-blades, *scapula.*
Scapularies. In ornithology, those feathers which take their rise from the shoulders of birds, and cover the sides of the back.
Scarify. To cut or scratch the skin of an animal, or to make small incisions, so as to draw blood from the smaller vessels without opening a large vein.
Scatebrous. Abounding with springs.
Scattered. When simple spots or marks are separate from each other and not arranged in a certain order.
Scent. The power of smelling; to perceive by the olfactory organs; as, to *scent* game.
Sciatic. Pertaining to the hip; as, the *sciatic* artery.

Scopiferous. Furnished with one or more dense brushes of hair.
Scopiform. Having the form of a broom or besom.
Scoria. Dross; the recrement or matter thrown off from metals in fusion.
Scoriaceous. Partaking of the nature of scoria.
Scoriform. In the form of dross; like scoria.
Scraggy. Lean, with roughness; rough, with irregular points, or an uneven surface.
Scrobiculate. Having the surface filled with small hollows or cavities; pitted.
Scrotum. The integument which contains the male organs of generation.
Scutibranchiata. The order of Gasteropodous Mollusca in which the gills are protected by a shield-shaped shell.
Scutiform. Having the form of a shield or buckler.
Scurf. A dry scab or crust formed on the skin of an animal.
Scutate. Covered or protected by large, flat scales.
Scutelliform. Shield-shaped.
Scutellum. The third section of the upper surface of each segment in insects.
Scutum. The second section of the upper surface of each segment in insects.
Sea-green. The color of sea-water.
Sealing. The operation of taking seals and curing their skins.
Seam (of a shell). The line formed by the union of the valves.
Sea-serpent. A huge marine animal like a serpent in form, and by some *supposed* to inhabit the sea.
Sebaceous. Consisting of or pertaining to fat; as, the *sebaceous humor*, a suet-like matter secreted by the *sebaceous glands*, which are small glands seated in the cellular membrane under the skin.
Secondaries, or *Secondary Quills.* Those quills which rise from the second bone of the wings. The posterior wings of an insect are denominated *secondary* if the superior wings, when at rest, are *not* placed upon them.
Secretitious. Separated by animal secretion.
Secretory. Performing the office of secretion; as *secretory* vessels. The organs of secretion are of various form and structure, but the most general are those called *glands*. Mucus, perspirable matter, &c. are properly *secretions*.
Securiform. When the last joint of the feelers (palpi) is triangular, and the preceding joint is connected with the vortex of the triangle.
Sedentary. Accustomed to sit much.
Segmentation. The act of dividing into segments.
Segments. The parts into which the body of an insect is divided, and which are thirteen. The great inosculating joints of the body.
Segregated. Set apart, separated from others.
Seminal. Pertaining to seed, or to the elements of production.
Semipalmate; Semipalmated. A term denoting that the toes are connected by a web extending only half their length.
Semirecondite. When the head of an insect is *half* covered by the shield of the thorax.
Senile. Pertaining to old age.
Senocular. Having six eyes.
Sensation. The perception of external objects by means of the senses.
Sensibility. The capacity of feeling or perceiving the impressions of external objects.
Sentient. Having the faculty of perception.
Septic. Proceeding from, or generated by, putrefaction.
Septiform (*Canthus*). When the canthns forms an elevated ridge or *septum*.
Serial. Pertaining to, or arranged according to, a series.
Sericeous. Silky; having a soft, smooth surface, resembling silk.
Sericteria. The glands which secrete the silk in the silkworm.
Series. An order or subdivison of some class of natural bodies.
Serpentine. Winding; spiral; like a serpent; running in a serpentine direction.
Serrate; Serrated. Toothed or notched with points like a saw.
Serrature. An indenture in the edge of any thing, like those of a saw.

Serricated. Covered with a short, thick, and silky down.

Serrulate. Having very minute teeth or notches.

Sesquialterous (*Fascia*). When both wings of an insect are traversed by a continued hand, and either the primary or secondary by another.

Sessile. Attached to any substance by a base, without a stalk or peduncle. When the head of an insect does not move in the socket of the trunk, but is attached to it by a kind of ligament.

Setaceous. Bristly; set witb bristles.

Setæ. Bristles, or parts resembling bristles.

Setiferous. Producing bristles.

Setiform (*Antennæ*). Short and rigid, tapering from the base to the apex like a bristle.

Setigerous. Bristly. When antennæ terminate in a bristle.

Setose. Covered with bristles; furnished throughout with irregular, harsh, bristly hair.

Setulose. Setose, with the bristles truncated.

Sexual. Denoting what is peculiar to the distinction and office of male and female.

Shagreen. A kind of grained leather prepared from the skin of a fish, a species of *Squalus*.

Sheath-winged. Having cases for covering the wings; as, a *sheath-winged* insect.

Shell. Tbe crustaceous or testaceous covering of certain animals; as, the *shell* of a tortoise, the *shell* of a lobster, the *shell* of an oyster, &c.

Shell-fish. An aquatic animal whose external covering consists of a shell, crustaceous or testaceous; as lobsters, crabs, oysters, &c.

Shining. Reflecting the light, but not intensely.

Sibilant. Making a hissing sound.

Siccative. Tbat which promotes the process of drying.

Silicious. Partaking of the nature and qualities of *silex*, one of the primitive earths usually found in tbe state of stone.

Simious. Resembling an ape or monkey.

Simous. Having a very flat or snub nose with the end turned up: concave; as the *simous* part of the liver.

Simple (*Oculi*). Eyes which do not consist of an aggregate of hexagonal lenses.

Simultaneous. Existing or happening at the same time.

Sinew. A tendon; that which unites a muscle to the bone.

Sinistral (as opposed to *dextral*). When a spiral shell has the aperture on the left side.

Sinistrorsal. Rising from left to right, as a spiral line or helix.

Sinistrous. Being on or inclined towards the left side.

Sinuate. Having large curved breaks in the margin, resembling bays.

Sinuous. Wavy.

Sinus. A groove, channel, or depression.

Siphon. A cylindrical tube; the pipe by which the chambers of a shell communicate; a fleshy sucker.

Siphonostomous. A term applied to crustaceous and other animals furnished with a suctorious mouth like a tube.

Siphunculus. A cylindrical canal perforating the partitions in polythalamous shells, as in *Nautilus spirula*.

Sizy. Thick and glutinous; as, *sizy* blood.

Skeleton. The bones of an animal body separated from the flesh and retained in their natural position. When the bones are connected by the natnral ligaments, it is called a *natural* skeleton; when by wires or other foreign substance, an *artificial* skeleton.

Smaragdine. The green splendor of the *emerald*.

Socket. Any cavity which receives and holds something else; as, the *sockets* of the teeth or of the eyes.

Solids. In anatomy, the bones, flesh, and vessels of animal bodies, in distinction from the blood, chyle, and other fluids.

Soliped. An animal whose foot is not cloven.

Solipedes. A family of Mammalia, of the order *Pachydermata*, having only one apparent toe and a single hoof on

each foot. One genus only is known, *Equus*.

Solivagant. Wandering alone.

Soluble. Susceptible of being dissolved in a fluid.

Somniferous. Causing or inducing sleep.

Somnolent. Drowsy; inclined to sleep.

Soporific; Soporiferous. Causing sleep, or tending to produce it.

Soul The spiritual, rational, and immortal principle in man, which distinguishes him from, and elevates him infinitely above, the brute creation.

Spasmodic. Affected with *spasms*, or involuntary contraction of muscular fibres in animal bodies.

Spathaceous. Having a sheath-like calyx.

Spathiform. Resembling spar in form.

Spatulate. Rounded and broad at the top and becoming narrow like a spatula.

Spawner. The female fish.

Spayed. Castrated, as a female beast.

Specific. Designating the peculiar properties of an animal, which constitute its species, and distinguish it from others. The *specific name* of an animal is appended to the name of the genus, and constitutes the distinctive name of the species.

Species. The lowest link in the chain of scientific classification, and that which admits of no further division. A species comprehends all those animals which may reasonably be supposed to be descended from one common, original stock: thus, all horses compose but a single species; and in the same manner, all oxen, sheep, goats, dogs, &c compose respective and appropriate species; and where a marked difference in any of them exists, they are said to be *varieties* of the species.

Speculum. The bright spot on the wings of ducks.

Spermatheca. A receptacle attached to the oviducts of insects.

Spermatozoa. The peculiar microscopic moving filaments and essential parts of the fertilizing fluid.

Spermatophera. The cylindrical capsules or sheaths in the Cephalopods which convey the sperm.

Sphacelus. Mortification of the flesh of a living animal: caries or decay of a bone.

Sphenoidal. Resembling a wedge; relating to the *sphenoid bone* at the basis of the skull.

Sphere. An orbicular body.

Spherical. Globular; as drops of water take a *spherical* form.

Spherulate. Having one or more rows of minute tubercles.

Spherule. A little sphere or spherical body.

Spicula. Fine pointed bodies like needles.

Spicular. Having sharp points.

Spine. A fine, long, rigid, pointed process.

Spinigerous (Elytra). When the *Coleoptera* have a spine common to them both.

Spinnaret. The articulated tubes with which spiders fabricate their web.

Spinous; Spinose. Armed with spines

Spiracles. The external apertures of the trachea in insects.

Spiral. Twisted like a cork-screw.

Spire (of a univalve shell). All the whorls except the one in which the aperture is situated, which is termed the body.

Spissitude. The denseness or compactness which belongs to substances not perfectly liquid nor perfectly solid; as, the *spissitude* of coagulated blood, &c.

Spongiose. Pertaining to a soft elastic substance resembling *sponge*.

Spontaneous. Acting by its own impulse; as, *spontaneous* motion.

Spumous. Consisting of froth or scum.

Spur. A spine that is not a process of the crust, but is implanted in it.

Spurious. Not genuine or legitimate.

Spurious or Bastard Wing. (*Alula spuria.*) Three or five quill-like feathers, placed at a small joint rising at the middle part of the wing in birds.

Squab. Unfledged; young and unfeathered; as, a *squab* pigeon.

Squamiform. Having the form or shape of scales.

Squamose; Squamous. Scaly; covered with minute scales.

Squarrose. Cut into *laciniæ*, or deep segments, that are elevated above the plane of the surface.

Stamina. Whatever constitutes the strength or support of any thing; as, the bones are the *stamina* of animal bodies; or, that man is likely to attain longevity, his *stamina* is so good, *i. e.* his frame is robust and his health is unimpaired.

Stellated. Consisting of star-like figures.

Stemmata. In entomology, three smooth hemispheric dots, generally on the top of the head, chiefly observable in hymenopterous insects, sometimes called *ocelli.* The simple and minute eyes of worms, and those which are added to the large compound eyes.

Sterelmintha. Intestinal worms, which have no true abdominal cavity.

Sterile. Barren; producing no young.

Sternal. Relating to the *sternum* or breastbone.

Sternellum. The third section of the lower surface of the segments of insects.

Sternum. The under surface of the segments of insects; in vertebrated animals, the breast-bone.

Stigmata. The breathing-pores of insects.

Stomach. A membranous receptacle in animal bodies, in which food is prepared for entering into the several parts of the body for its nourishment.

Stomato-gastric. Pertaining to the nerves which are principally distributed upon the stomach and intestinal canal.

Striæ. In conchology, fine, thread-like lines in the exterior surface of many shells, longitudinal, transverse, or oblique.

Striate; Striated. Marked with lines or stripes. Having rather *slightly* impressed longitudinal parallel lines.

Stridulous. Making a small, harsh, creaking sound.

Structure. Manner of organization.

Struthious. Pertaining to or like the ostrich.

Stupeous. Covered with long, loose scales resembling *tow.*

Stupulose. Covered with coarse, decumbent hairs.

Subaqueous. Living or being under water.

Subclavian. Situated under the clavicle or collar-bone.

Subcordate. In shape somewhat like a heart.

Subcutaneous. Situated under the skin.

Subereous. Pertaining to a soft, elastic substance somewhat resembling *cork.*

Subgenera. Subordinate genera.

Subglobular. In form approaching to that of a globe; nearly round.

Subjacent. Lying nearly, but not directly, underneath.

Sublimated. Brought into a state of vapor by heat, and again condensed.

Submerged. Put under water.

Submuscular. Placed beneath muscles or muscular layer.

Subocular. Situated under the eye.

Suborbicular. Nearly spherical.

Subovate. Nearly in the form of an egg.

Subpedunculate. With a short pedicel.

Subprehensile. Holding in a moderate degree.

Subsidence. The act of sinking or gradually descending, as ground.

Subsist. To be maintained with food.

Subspecies. A subordinate species.

Subulate. Awl-shaped.

Succedaneous. Supplying the place of something else.

Succulent. Full of juice; juicy.

Suctorial. Living by means of, or endued with the power of, suction.

Suctorious. When the upper jaws of an insect have an orifice by which they imbibe their food.

Sudorific. Exciting perspiration.

Suffraginous. Pertaining to the knee-joint of a beast.

Sulcate; Sulcated. Furrowed. Having deeply impressed longitudinal parallel lines.

Sulci. Furrows or ridges.

Supra-ciliary. Situated above the eye-brow.

Supra-orbital. Being above the orbit of the eye.

Suspended. When one part is joined to another by a ligature, without being inserted in it.

Sustentation. Use of food; support of life.

Sutural. Appertaining to a suture.

Suture. A hollow line or division in univalve shells, the spiral line of which separates the wreaths. The seam or

joint which unites the bones of the skull. The line of separation of any two parts of a crust which are connected only by membrane or ligament, but do not inosculate. *Spurious Suture*, an impressed line in any part of a body, which resembles a suture, but does not really divide the crust.

Symphysis. In anatomy, the union of bones by cartilage: in surgery, a coalescence of a natural passage.

Synarthrosis. Union of bones without motion, as in sutures.

Synchondrosis. The connection of bones by means of cartilage.

Syndactylous. Having the front toes united, the terminal joint only being free.

Synonyme. A word or name which has the same signification as another. *Synonymous Terms* are names applied to the same groups or species of animals by different authors.

Synovial. Pertaining to *synovia*, a fluid secreted into the cavities of the joints, for the purpose of lubricating them.

Systematic. Formed with regular connection and adaptation or subordination of parts to each other, and to the design of the whole; as a proceeding according to some methodical plan or system.

T.

Tænoid. Ribbon-shaped, like the Tænia, or tapeworm.

Tardigrada. The name given to a family of anomalous Mammalia (the Sloths), differing widely from all other quadrupeds in their habits, economy, and osteological structure.

Tarsus. The terminal portion of the leg in insects; affording important characters for generical and family distinctions. It is a jointed piece, armed at its extremity with one or two slender, curved hooks (*ungues*), and often accompanied by membranous or fleshy cushions (*pulvilli*). The number of joints varies from two to five.

Tawny. A pale, dirty orange color.

Tectibranchiate. Belonging to the order of Mollusca in which the gills are covered by the mantle.

Tegument. The skin or other natural covering of an animal body; a substance serving to defend any otherwise exposed part.

Tegumentary. Having the properties of, or belonging to, a tegument; consisting of teguments.

Telum. The thirteenth or last segment of insects.

Temporal. Pertaining to the temples; as the *temporal* arteries, &c.

Tentacula. The feelers of snails, &c.

Terebella. The instrument or organ with which many female insects bore holes to deposit their eggs.

Terminal Forming the extremity.

Terminology. That branch of the science of Natural History which explains all the terms used in the description of natural objects.

Tertials. Those feathers in the wings of birds which take their rise from the second bone, at the *elbow-joint*, forming a continuation of the secondaries, and seem to do the same with the scapulars, which lie over them.

Tertiary (in geology). Of the third formation. The *tertiary formation* consists of a series of horizontal strata, more recent than chalk-beds, consisting chiefly of sand and clay, and frequently embracing vast quantities of organic remains of the larger animals.

Tessellated. Checkered like a chess-board.

Testacea. The third order of worms, including those which are covered with a testaceous shell.

Testaceous. Composed of the materials which constitute shells, viz. carbonate of lime and animal matter. Pertaining to the *Testacea*. Also applied to the color resembling a *tile*, a dull-red.

Testudinal; Testudinous. Pertaining to the tortoise, or resembling it.

Testudinarious. Painted with red, black, and yellow, like tortoise-shell.

Testudineous. Resembling tortoise-shell.

Tetrabranchiate. Belonging to the order of Cephalopods with four gills.

Tetradactylous. Having four toes.

Tetragonal. Whose horizontal section is quadrangular.

Tetrahedral. Having four sides.

Tetrapod. An insect having only four perfect legs.

Tetrapterous. Having four wings.

Theca. The sheath or case of the *proboscis* in insects.

Theory. An exposition of the general principles of any science; or, the science, distinguished from the practice, of an art.

Thermal. Pertaining to heat; as, *thermal waters*, warm or tepid mineral waters.

Thoracic. Pertaining to the breast, or thorax; as, the *thoracic* arteries. Also belonging to an order of bony fishes, respiring by means of gills only, the character of which is that the branchia are ossiculated, and the ventral fins are placed underneath the thorax, or beneath the pectoral fins.

Thorax. The anterior mass in pedunculated insects.

Thrill. To feel a sharp tingling or shivering sensation running through the body.

Throb. To beat rapidly, as the heart or pulse, in consequence of agitation.

Tibia. The third portion of the legs in insects.

Tibial. Belonging to the tibia; as the *tibial* arteries.

Tiercel, or *Tiercelet.* In falconry, a name given to the male hawk, as being a third part less in size than the female.

Titillate. To excite by tickling.

Torose. Swelling into knobs or protuberances.

Tomentose. Covered with short, interwoven, inconspicuous hairs.

Toneless. Having no tone; unmusical.

Topazine. The yellow splendor of the topaz.

Topical. Limited; local, as a *topical* remedy.

Tortoise-shell. The shell or scales of the tortoise, a valuable article in various manufactures.

Tortuous. Twisted, wreathed, winding.

Torulose (joints of insects). When they are a little tumid.

Toxicology. A treatise or discourse on the nature of poisons.

Tracheæ. The air-tubes, which in insects are the organs of respiration.

Tracheal. Pertaining to the trachea or windpipe.

Trachelipods. The Mollusca which have the locomotive disc or foot attached to the head.

Tracheotomy. The surgical operation of making an opening into the windpipe.

Tractile. Capable of being drawn out in length.

Train-oil. The oil produced from the blubber or fat of whales by boiling.

Tramosericeous. The splendor of satin.

Transfigured. Changed in form.

Transformed. Changed in form or external appearance.

Transfused. Poured or transferred from one vessel into another.

Translucent; Translucid. Transparent; clear.

Transmarine. Living or being beyond the sea.

Transmigratory. Passing from one place, body, or state to another.

Transmitted. Caused or suffered to pass through; as, sound is *transmitted* by means of vibrations of the air.

Transpire. To exhale; to pass off by insensible perspiration.

Transude. To pass through the pores or interstices of texture, as perspirable matter or other fluid.

Transverse. Crossing each other: when the longitudinal line is cut through at right angles.

Trapezate. Quadrilateral with the *four* sides unequal, and none of them perfectly parallel.

Trapeziform. Shaped like a trapezium.

Trapezoid. Quadrilateral, with two sides unequal and parallel.

Tread. To step or walk; to copulate, as fowls.

Trematoda. The order of Entozoa characterized by suctorial pores.

Trenchant. Sharp; cutting; as *trenchant* claws.

Trichotomous. Divided into three parts.

Tridactyle. Three-fingered.

Tridactylous. Having three toes.

Tridentate. Having three teeth.

Triedral. Having three sides.

Triform. Having a triple form or shape.

Trigonal. Having three angles.

Trilobate. Divided into three lobes.

Tripartite. Divided into three parts.
Tripedal. Having three feet.
Triquetrous. Whose *horizontal* seetions are equilateral triangles.
Triradiate. Consisting of three spokes or rays.
Triradiated. Having three rays.
Triturate. To reduce to a very fine powder by pulverization.
Trivalvular. Having three valves.
Troglodytical. Resembling, in mode of life, the *Troglodytes*, a people of Ethiopia, whom the ancients represented as living in caves.
Trophi. The parts of the mouth (in insects) employed in acquiring and preparing the food.
Tropical. Pertaining to or being within the tropics; as, tropical climates, winds, &c.
Truncate (*elytra*). When they are shorter tban the abdomen and transverse at the end.
Truncated. Cut off short, or terminating abruptly.
Truttaceous. Belonging to fish of the trout kind.
Tubercle. A little pimple-like knob.
Tubercular: Tuberculous. Full of knobs or pimples.
Tuberculate. Covered with small protuberances.
Tuberosities. Prominent knots or excrescences.
Tubicolar. Inhabiting a tube.
Tubular. In the shape of a tube; hollow and cylindrical.
Tubulate; Tubulous. Hollow.
Tubulose. When the tongue of an insect emerges from the labium, is long and tubular, and capable of inflation.
Tuft. A bunch of feathers or hairs.
Tumid. Protuberant; enlarged or distended.
Tumular. Formed into a heap or hillock.
Tunicata. The elass of acephalous Mollusca which are enveloped in an elastic tunic not defended by a shell.
Tunicated. Coated.
Turbinate. Top-shaped; triangular, with curved sides.
Turbinated. Wreathed conieally from a larger base to a kind of apex; as *turbinated* shells.
Turbiniform. Whose vertical section is turbinate, and *horizontal* circular
Turgid. Swollen.
Turreted. When tbe head of an insect is producted into a kind of colnmnar recurved turret or rostrum, in the sides of which, towards tbe end, the eyes are fixed.
Turrilite. The fossil remains of a spiral multilocular shell.
Tympanum. The drum of the ear.
Type. A general form, such as is common to the species of a genus, or the individuals of a species.
Typified. Figured, or represented by a model form, or resemblance.

U.

Ubiquity. Existence in all places or everywhere at the same time.
Uliginous. Muddy, oozy, slimy.
Ulnar. Pertaining to the *ulna;* as, the ulnar nerve.
Ultramarine. Situated or beyond the sea. Also, the name of a beautiful and durable sky-blue color, formed of the mineral called *lapis lazuli.*
Umbilical. Pertaining to the navel.
Umbilicated. Having a depression in the centre like a navel.
Umbilicus. A hole, either deep or shallow, on the side of tbe inner lip in spiral shells, formed by the inner edges of the whorls not touching each other.
Umbles. The entrails of a deer.
Umbo (in bivalve shells). The prominent part which turns over the hinge.
Umbonate. Bossed; having a raised knob in the centre.
Umbraculate. When there is upon the head of insects an umbrella-shaped process.
Uncinated. Set or covered with bent spines like hooks.
Unctuous. Fat, oily; having a resemblance to oil or grease.
Underground. Below the snrface of the earth.
Undiaphanous. Not pellucid.
Undose. Having undulating nearly parallel broader depressions which run into each other, and resemble tbe sand of the sea-shore when left by the tide.

Undulated. Having a waved surface.
Undulating. Waving; rising and falling; vibrating.
Undulatory. Moving in the manner of waves; as, the *undulatory* motion of the air is supposed to be the cause of sounds.
Unfigured. Representing no animal form.
Unfledged. Not yet furnished with feathers.
Ungues. Claws.
Unguiculated. Having sharp claws; armed with a claw.
Ungula. The terminal joint of the *tarsus.*
Ungulate. Shaped like a horse's hoof.
Unicornous. Having only one horn.
Unigenous. Of one kind; of the same genus.
Unilateral. Being or existing on one side only.
Unilocular. With a single chamber or compartment.
Uniparous. Producing one at a birth.
Univalve. The name given to those shells which consist of one valve only.
Univalvular. Having only one valve.
Unnatural. Contrary to the laws of nature; not in conformity with natural feelings or instincts.
Urceolate. Swelling in the middle, like a pitcher.
Uropygial. Belonging to the rump.
Ursine. Pertaining to or resembling a bear.
Uterine. Pertaining to the *uterus* or womb.

V.

Vaccine. Pertaining to cows; as, the *vaccine* disease, or cow-pox.
Vaginopennous. Having the wings covered with a hard case or sheath, as coleopterous insects.
Valve. One of the pieces or divisions in bivalve and multivalve shells. A membraneous partition within the cavity of a shell, which opens to allow the passage of a fluid in one direction, and shuts to prevent its regurgitation.
Valvular. Containing valves.
Varices. Longitudinal raised bands or ridges, which occur at regular distances in some univalves. They are the remnants of former apertures, and mark the progressive enlargement of the shell.
Varicose. Preternaturally enlarged; as, *varicose* veins.
Variegated. Diversified in colors or external appearance.
Variety. The well-marked difference which often occurs between animals of the same species.
Variolous. Pertaining to or resembling the small-pox.
Vascular. Composed of, or pertaining to, the vessels of animal bodies, as arteries, veins, and the like, which form the *vascular* system.
Vent. That part of a bird near the anus; that part near the extremity of the abdomen in birds.
Venter. The abdomen or lower belly.
Vent-feathers. Those feathers that lie from the vent, or *anus*, to the tail underneath.
Ventral. Pertaining to the belly. The *ventral* fins in fishes are placed between the anus and the throat.
Ventricose. Swollen in the middle; inflated.
Ventricular. Belonging to a ventricle.
Ventriculus. The second portion of the alimentary canal in insects.
Vermes. A term for worm-like animals: applied in a very extensive sense by Linnæus.
Vermicular. Resembling a worm, and more particularly the motion of a worm; as, the *vermicular* motion of the intestines, called also *peristaltic.*
Vermiculate; Vermiculated. Covered with tortuous markings or excavations, like worm-eaten wood.
Vermiform. Worm-shaped.
Vermilion. A delicate bright-red color.
Verminous. Tending to breed vermin.
Vermiparous. Producing worms.
Vermivorous. Feeding on worms.
Vernacular. Belonging to a person by birth or nature.
Vernal. Belonging to the spring; appearing in the spring.

Verriculate. Having one or more verricules.
Verricule. A thick-set tuft of parallel hairs.
Verruca. A small, flattish, wart-like prominence.
Verrucose. Covered with tubercles resembling warts.
Versicolored. Of various and changeable colors.
Vertebræ. The joints of the spine or backbone of an animal.
Vertebral; Vertebrated. Belonging to the *Vertebrata;* having a backbone or vertebral column, containing the spinal marrow.
Vertebrata. That large and important class of animals distinguished by having a backbone or vertebral column, as man, quadrupeds, birds, amphibia, and fishes.
Vertex. The top, or highest part.
Vertical. Erect; perpendicular.
Verticulate. Arranged like the rays of a wheel or spindle.
Vesicatory. Having the property of causing blisters.
Vesicle. A little bladder, or a portion of the cuticle separated from the skin and filled with some humor.
Vesiculæ. Receptacles like little bladders.
Vesicular; Vesiculous. Pertaining to vesicles; having little bladders or superficial glands.
Vibratile. When there is a constant oscillation of any part.
Vibratory. Consisting in vibration or oscillation; as, a *vibratory* motion.
Vibrissæ. The hairs that, in certain birds, stand forward like feelers: in some birds they are slender, as in flycatchers, &c., and point both upwards and downwards, from both the upper and under sides of the mouth.
Vicarious. Filling the place of another.
Vigor. Active strength or force of body in animals.
Villi. Small processes like the pile of velvet.
Vinous. Having the qualities of wine.
Violaceous. Of a violet color, or resembling violets.
Viperous. Like a viper, or having the qualities of one.
Viridity. Greenness; verdure.
Virile. Belonging to the male sex.
Virulent. Very poisonous or venomous.
Virus. Foul or contagious matter in an ulcer, &c.
Viscera. The organs contained in any cavity of the body, particularly in the three venters, the head, thorax, and abdomen.
Viscid. Glutinous; not readily separating.
Viscous. Clammy; adhesive; tenacious; as a *viscous* juice.
Visual. Pertaining to sight; as, *visual* rays are lines of light imagined to come from the object to the eye.
Vitals. Parts of animal bodies essential to life, such as the viscera.
Vitelline. Of or belonging to the yolk of an egg.
Vitellus. The yolk of an egg.
Vitreous. Resembling glass; as, the *vitreous* humor of the eye.
Vitrescent. Tending to become glass.
Vitriform. Having the form or resemblance of glass.
Vivacious. Lively; active; sprightly.
Vivary. A place for keeping living animals in; as a pond, a park, &c.
Vivid. Exhibiting the appearance of life or freshness.
Vivify. To endue with life; to animate.
Viviparous. Pertaining to those animals which bring forth their young alive, as distinguished from *oviparous*, producing eggs, as birds.
Vocal. Uttered or modulated by the voice; as, the *vocal* music of the woods.
Vociferous. Clamorous; making a loud outcry.
Voided. Emitted; evacuated; as, he *voided* worms.
Volatile. Flying; passing through the air on wings, or by the buoyant force of the atmosphere; having the power to fly. Also, capable of wasting away, or of easily passing into the aeriform state.

Volute. A spiral turn in shells, &c.

Volutite. A petrified shell of the genus *Voluta.*

Vomer. The palate or upper part of the mouth of a fish.

Voracious. Rapacious; eager to devour.

Vortex. A whirlpool; a whirlwind.

Vulpine. Pertaining to the fox.

Vulturine. Having the qualities of, or resembling, a vulture.

Vulva. A mark in several bivalve shells, formed when the valves are united on the posterior and anterior slopes.

W.

Wall-eyed. Having a disease in the crystalline humor of the eye, which gives it a white appearance.

Wattle. The fleshy excrescence which grows under the throat of some fowls, as the turkey, and also of some fishes.

Wean. To accustom and reconcile a child or other young animal to a want or deprivation of the breast.

Web. The membrane which unites the toes of many water-fowls. Also, a plexus of very delicate threads or filaments which a spider spins from its bowels, and which serves as a net to catch flies and other insects for its food.

Webbed. Having the toes united by a membrane or web; as the webbed feet of aquatic fowls.

Web-footed. Palmiped; having webbed feet.

Whelky. Protuberant and embossed; resembling the *whelk*, a marine univalve shell.

Whine. To express murmurs by a plaintive cry.

Whir. To sound like a body passing swiftly through the air.

Whistle. A call, such as sportsmen use to their dogs; a shrill sound made by pressing the breath through a small orifice of the lips; the sound of winds passing among trees or through crevices, &c.

White (of the eye). That part of the ball of the eye surrounding the iris or colored part. It owes its whiteness to the *tunica albuginea* or *adnata*, a partial covering of the fore part of the eye, formed by the expansion of the tendons of the muscles which move the eye-ball.

White (of an egg). The albumen, or pellucid viscous fluid, which surrounds the *vitellus* or yolk.

Whiz. To make a humming or hissing sound, like a ball or arrow passing through the air.

Windgall. A soft tumor on the fetlock joints of a horse.

Wing-shell. The shell that covers the wings of certain insects.

Withers. The juncture of the shoulder-bones of a horse, at the bottom of the neck.

Wood-fretter. An insect or worm that eats wood.

Wrinkled. Ridges and furrows formed on the skin or any smooth surface.

Writhe. To twist with violence; to distort.

X.

Xiphoid (cartilage). A small cartilage situated at the bottom of the breast-bone, called also the *ensiform* cartilage.

Xylophagous. Destroying and feeding on wood.

Y.

Yearling. A young beast one year old, or in the second year of his age; as, a *yearling* heifer.

Yelp. To bark in a particular way; as, a *yelping* cur.

Z.

Zigzag. Having short turnings and angles.

Zoned. Surrounded with one or more girdles.

Zoögraphy. Zoölogy, which latter term is now generally used for the science that describes and classifies animals.

Zoölogy. That branch of Natural History which treats of all the beings comprised in the term "Animal World."

Zoölyte. An animal snbstance, petrified or fossil.

Zoöphytic. Pertaining to the Zoöphytes.

Zoöphytology. That branch of Natural History which treats of the structure, habits, &c. of Zoöphytes.

Zygodactylous. Having the toes joined in pairs; as in the parrot tribe.

Zygomatic. Pertaining to the *zygoma*, a bone of the head, called also *os jugale*, or cheekbone; or to the bony arch under which the temporal muscle passes.

THE END.

Nº 88.

CEANOTHUS AMERICANUS.

Jersey-tea, red-root.

RHAMNACEÆ.

Buckthorns.

N°. 88.

CEANOTHUS AMERICANUS.

JERSEY TEA, *Red-root.*

Place—United States.
Quality—Diuretic.
Power—Purifying, purgative.
Use—Dysentery, syphilitic complaints.

BOTANICAL ANALYSIS.

Natural Order. Dumocæ.—L. Rhamnaceæ.—J.

CLASS V. *Pentandria.* ORDER *Monogynia.*

Linn. *Sp. Pl.* 284. Loud. *Ency. Pl.* 178. Raff. *Med. Flor.* ii. 205. U. S. *Dis.* 1240. T. & G. i. 264. Griff. *Med. Bot.* 218. Per. *El. Mat. Med.* 354. Beach. *Fam. Ph.* 662. Kost. *Mat. Med.* 485. Wood, *Class Book*, 217.

GENUS. CEANOTHUS.

Κεανωθος is a name used by Theophratus to designate a prickly plant, from κεω, to prick, because it pricks at the extreme parts.

SYNONYMES.

THE ESSENTIAL CHARACTERS.

CALYX. *Sepals* four or five, united at base, valvate in æstivation.

COROLLA. *Petals* four or five distinct, cucullate or convolute, inserted into the orifice of the calyx. Sometimes wanting or none.

STAMENS. Opposite the petals, four or five.

OVARY. Superior, or half superior, with an erect ovale in each cell.

FRUIT. A capsule, drupe or berry.

SEEDS. Not numerous.

THE SECONDARY CHARACTERS.

Ceanothus. *Calyx* tubular, campanulate, five-cleft, separating transversly after flowering. *Petals* five, saccate-arched, with long claws. *Stamens*, mostly exserted. *Style*, mostly three-cleft. *Capsule* obtusely triangular, three-celled, three seeded, surrounded at base by the persistent tube of the calyx.

Petals scale-like, vaulted. *Claws* long standing in the five-cleft, cup-form, calyx. *Stigmas* three. *Berry* or *capsule* dry, three-grained, three-celled, three-seeded, three-parted, opening on the inner side.

THE SPECIFIC CHARACTERS.

Ceanothus Americanus. *Leaves* oblong-ovate, serrate, three veined. *Panicles* axillary, elongated.

Leaves ovate, acuminate, serrate, three-nerved, pubescent beneath. *Panicles* axillary, long-peduncled, sub-corymbed.

THE ARTIFICIAL CHARACTERS.

Class Pentandria. *Stamens* five. Order Monogynia. Polypetalous. *Flowers* inferior, regular. *Stamens* opposite to the petals. *Shrubs*. *Stem* thorny. *Calyx* four-five cleft.

NATURAL HISTORY.

This almost American genus consists of shrubs or shrubby plants. The roots of the whole of them are large, reddish, and astringent. The leaves are alternate, usually ovate or elliptical, serrate or entire, persistent or deciduous. The flowers are white, blue, or yellowish in umbellike fascicles, which are aggregated at the extremity of the branches. There are several varieties, differing principally in the form of the leaves. It is probable that the medical properties of all the species are very much the same, though one only has attracted attention. The New Jersey tea is found in all parts of the United States, in copses and dry-woods, and very abundant on the barrens at the west. The plant flowers from June until September, is of very easy culture, and of very little beauty.

The root of the Ceanothus Americanus is large and dark red. The stem is shrubby, suffruticose, from two to four feet high, slender, with many round, smooth branches, the younger of which are pubescent. The leaves are three-nerved, rounded, or

a little cordate at base, ovate or oblong-ovate, somewhat acuminate at the apex, serrate, nearly smooth above, and whitish, tomentose beneath, the pubescence of the veins and petioles somewhat reddish, they are thrice as long as broad, very downy, with soft hairs beneath. Flowers minute, in crowded panicles from the axils of the upper leaves. The calyx is white, five-cleft, and the upper portion separates by a transverse line, leaving the tube adhering to the fruit. The corolla is formed of five saccate, arched petals, which are longer than the calyx, and with filiform claws at base. The stamens are five, enclosed in the curiously vaulted corolla, exserted and bearing ovate, two-celled anthers. The ovary is three-angled, and surrounded with a ten-toothed disk. The styles are three, united to the middle, but diverging above. The fruit is dry and coriaceous, obtusely triangular, three-celled and three-seeded. The seeds are convex externally, and concave within, the cavity marked with a longitudinal line.

CHEMICAL AND MEDICAL PROPERTIES AND USES.

The Ceanothus Americanus is a well-known plant and is considerably celebrated for having been much used during the Revolutionary war of the United States, as a substitute for the Chinese tea, whence its common name. The leaves when dried have an odor very much resembling that of the black tea of commerce, and are said to form an excellent substitute for it.

The leaves of the Jersey tea plant are slightly bitter, and somewhat astringent. The root is much more active, and was very highly esteemed among the Indians who used it as an astringent and febrifuge. It was afterwards very much employed also as a remedy in gonorrhœa, and even syphilis. In the first of these complaints, it is stated by Ferrien that a cure is effected in two or three days, and in the latter, even inveterate cases yield to it in fifteen. It is given in the form of decoction made in the proportion of two drachms of the root to a pint of water. Adamson also observes that he has employed it in these diseases with considerable success. These statements receive confirmation, in part at least, from the success that has attended this method of cure in private and domestic practice, as well as by several physicians and practitioners of the country.

In a communication to the Boston Medical and Surgical Journal (Sept., 1835), Dr. Hubbard speaks in very high terms

of a decoction of the leaves as a wash and gargle in the aphthœ of children, and in those cases of sore mouth subsequent to fever, and states that he was successful with it even where all other means had failed. He also found it very beneficial in those cases of ulceration of the fauces attendant on scarlatina, in these he used it in combination with Mayweed, *Maruta cotula*, and borax. He further adds that as an astringent in dysentery, he found it fully as efficacious as the Hardack, *spirea tomentosa*, It may be used in diarrhœa, cholera infantum, and other complaints in which astringents are indicated.

With this testimony in its favor, Ceanothus Americanus certainly deserves a more extended trial, and should it be found to merit, even in part, what has been said of it, it will rank as an important article of our native Materia Medica.

It may be proper to mention that the *Ceanothus caruleus* is considered as a powerful febrifuge in Mexico, and that the *Ceanothus decolor* is employed in dysentery in Senegal.

Men of observation and science ought to be employed to explore the country with a view to its geology, mineralogy, botany, zoology, and agriculture. They ought not only to examine with their own eyes, but to avail themselves of local information to be derived from intelligent men in every part of the State. By these means a mass of valuable and authentic information may be obtained which can in most cases be acquired in no other way.

The celebrated Linnæus often expressed a wish to visit America, in order to explore its vegetable productions. His disciple, Kalm, travelled through this country in 1748 for that purpose. Since the revolutionary war several European princes have sent scientific men here to make collections and observations on our natural history. In fact, several of the most valuable and interesting observations we possess, were made by them, who devoted themselves almost exclusively to this special object—the unfolding the bright volume of Creation, the pages of which are daily and hourly exhibited, " written," to use the impressive words of Lord Bacon, " in the only language which hath gone forth to the ends of the world, unaffected by the confusion of Babel."

It may be safely affirmed that Botany is capable of affording more to interest and instruct, more to refresh and relax the well-disposed mind, than any other pursuit. It is therefore important to encourage and promote this pleasure.

PROSPECTUS

OF

GOOD'S FAMILY FLORA

AND

MATERIA MEDICA BOTANICA.

A PERIODICAL.

Twelve Numbers form a Part, published Quarterly, in January, March, June, September, and December of each year, and these Parts form a Volume. Subscription, Three Dollars per annum, in advance.

The first volume and several parts also of the second volume of the Family Flora being now published, the public, as well as the profession, are, we trust, in possession of sufficient materials to form a judgment of the character of the whole. We cannot but feel exceedingly flattered by the expression of praise that has been bestowed upon the work by those who are the most competent to form an opinion on the subject. The approval of the press has also been highly gratifying.

The following plan has been adopted in describing the plants illustrated in this work.

The botanic name of each plant, in large capitals, appears first; then the common or vulgar name in italics; next follows its place or habitation, and some of its most prominent qualities, in smaller type, and after, a very short epitome of its power and application. The whole of this division is intended to be terse and concise, exhibiting an appropriate head to the body of the matter.

The botanical description of each plant embraces those characteristics (essential and secondary as well as specific characters) which botanists have fixed on as the only means by which a plant, that is not familiar to the reader of an account of it, can, with certainty, be known; and these descriptions are given in the language employed by modern botanical writers. This method of discovering a plant by comparisons derived from a few particulars, and these of the most striking kind, is certainly an agreeable and noble exercise of the understanding.

The Natural History of each plant introduced in this publication embraces only a general and familiar account of whatever does not properly come under the botanical analysis; and as this division of the subject is more particularly calculated for the general reader, it is hoped, with the colored engravings, there will be no difficulty in identifying the several plants described. This study of plants possesses one very eminent advantage; it doubles the pleasure of every walk and journey, and calls forth to healthy exercise the bodily as well as mental powers.

For the chemical and medical department recourse has been had to every work of reputation to which access could be obtained; and as much useful information regarding each of the plants treated of has been brought together as could be conveniently crowded into a small space. We are often placed in situations in which it may be highly important to be able to recognize the vegetable which yields a particular medicine, and we are so constantly liable to imposition from the collectors of herbs, that the necessity of possessing the means of distinguishing by infallible marks the various vegetable products of the earth will be readily recognized.

The extreme difficulty and great expense of executing the colored plates, at once in an accurate and elegant style, can only be appreciated by those who have actually attempted something of the same kind. It is gratifying, however, to find that the general execution of the work has met with the public approbation, — a fact of which the favorable notices of the press and the large subscription list afford ample evidence. It is also encouraging to learn that the Family Flora has already been adopted as a text-book in many of our most respectable seminaries of education; and in noticing this fact, it may be proper to remark that the student who may so use this work will find his labors greatly facilitated by using, in connection with it, the excellent "Class-Book of Botany," by Alphonso Wood, A. M., a new edition of which has recently been published.

CONTENTS OF THE FIRST VOLUME OF GOOD'S FAMILY FLORA.

EXTRA PART.

MARCH, OR SPRING PART.

JUNE, OR SUMMER PART.

SEPTEMBER, OR AUTUMN PART.

DECEMBER, OR WINTER PART.

CONTENTS OF THE SECOND VOLUME OF GOOD'S FAMILY FLORA.

EXTRA PART.

MARCH, OR SPRING PART.

JUNE, OR SUMMER PART.

SEPTEMBER, OR AUTUMN PART.

DECEMBER, OR WINTER PART.

COMMENDATIONS

OF

GOOD'S FAMILY FLORA.

It is by no means the intention of the author, in this advertisement, merely to puff or extol his work, but simply to call public attention to it. He only asks that persons examine the several numbers, or semimonthly publications, of the FAMILY FLORA as they come from the press; and then, if they do not acknowledge, and are not convinced, that it contains the choicest and most valuable matter as a TEXT-BOOK, — notwithstanding it is also a most acceptable and appropriate PARLOR OR LADY'S BOOK,—and withal the cheapest PERIODICAL extant, not being affected by age or fashion, but always new, popular, and interesting, — he does not ask subscription or patronage; for he maintains that all claims to public favor or support must rest solely upon the real merits of the work, and unless the work in this respect maintains itself, and commands success, he would prefer abandoning it altogether. As evidence, however, of the opinions of some of our most eminent professors, *who are best able to judge on the subject*, he submits the following communications, taken at random from several correspondents who have favored him with their kind commendations.

He avails himself also of this opportunity to tender his most hearty welcome to the new subscribers who are continually coming in, and whose letters contain such flattering notices of the FAMILY FLORA. There is room for them and their friends, and no effort shall be spared to make the FAMILY FLORA more and more worthy of their high encomiums.

From J. Brown, M. D., Professor of Chemistry and Scientific and Medical Botany, Botanical Medical College, Ohio.

PETER P. GOOD: —

Dear Sir: Having examined the Family Flora and Materia Medica Botanica, I am happy to say the scientific arrangement of the work is admirable; giving both the natural and artificial modes of classification.

The mechanical arrangement and execution is neat and attractive. No family should fail to possess the work.

Very respectfully,

J. BROWN, *Syracuse, N. Y.*

From Edward E. Phelps, M. D., Lecturer on Medical Botany in Dartmouth College, Hanover, N. H.

To whom it may concern: — The bearer, Mr. P. P. Good, is the editor of an excellent work on Medical Botany, with which I have for some months past been acquainted.

He is now wishing to obtain subscribers for it, and I would take this opportunity to say to those physicians who would like to acquire a more perfect knowledge of our own medical plants, that in my opinion they will never be able to do so on any better terms than those offered by Mr. Good.

To those with whom I have had some conversation on Medical Botany I would add, that nothing better than the present work (even if it could be obtained) is needed to facilitate the study of Medical Botany.

EDWARD E. PHELPS, M. D.,
Lecturer on Medical Botany in Dartmouth College.

From A. Young, Jr., M. D., (appointed by the Legislature) *Botanist to the State of Maine.*

Peter P. Good: —

Dear Sir: Please accept my thanks for the numbers of the Family Flora and Materia Medica Botanica, which you had the goodness to leave with me, and also those you have mailed to me subsequently.

I have examined them with much pleasure and satisfaction, and indeed I know not how your work can be improved to answer the end for which it is designed. As a cheap, popular, and instructive Flora it cannot be excelled.

The engravings are good and correct. The typography neat and agreeable to the eye, and the subject-matter, relating to the *uses of plants*, sound and judicious.

I think the work finely adapted as a botanical guide for the physician and the student who seek to obtain knowledge which they have not yet acquired; in a word, it merits my warmest and most decided praise.

I hope you will receive sufficient support to enable you to complete such an agreeable publication.

Very respectfully, your obedient servant,

A. YOUNG, Jr.,
Botanist to the State of Maine.

From S. Pearl Lathrop, M. D., Principal of the Middlebury Female Seminary, and Instructor in Botany, Middlebury College, Middlebury, Vt.

Peter P. Good: —

Dear Sir: Permit me to express to you my unqualified approbation of your very worthy and happy effort to introduce the heads of families, and thus the rising generation, to a familiar acquaintance with the properties and uses of particular individuals of the several orders of the vegetable kingdom. Your work, illustrated as it is with beautiful plates, drawn from nature, will not only enable them to discover the plants described, but awaken a taste for one of the most agreeable and useful branches of natural science. The chemical and medical properties and uses of plants, brought to view in your work, are invaluable, and are peculiarly adapted for the general as well as the scientific reader.

Very truly, &c.,

S. PEARL LATHROP, M. D.,
Principal of the Middlebury Female Seminary.

From Joseph D. Friend, M. D., (Author of a Theory and Practice of Medicine,) *Middletown, N. Y.*

To my Botanic Friends throughout the Country: — From a careful examination of Mr. Good's Family Flora, already published, and the design of its publication in future, I do most cheerfully recommend it to the patronage of my botanic friends throughout the country. This work will fill a void which has always existed in this department of science, and will enable the physician and student to command in a concise form a thorough knowledge of the genus, history, and medical and chemical properties of the entire vegetable kingdom.

Mr. Good has long been known as a most successful teacher, a ripe scholar, and a gentleman in whose integrity the public may place the most implicit confidence.

JOSEPH D. FRIEND

From J. Barratt, M. D., Middletown, Ct.

GOOD'S FAMILY FLORA.—I have examined this cheap and excellent new work by Mr. Good, and take pleasure in recommending it to students in Botany.

J. BARRATT.

From the Eclectic Medical Journal, Cincinnati, Ohio.

FAMILY FLORA.—Among the various medical periodicals, there is none of greater interest than the "Family Flora and Materia Medica Botanica," emanating from the pen of Peter P. Good, of Cambridge, Mass.

I have perused this work with much satisfaction. It is confined (as its name imports) to the subject of Medical Botany, and is designed for the use of both the professional and non-professional reader. In neatness, style, and arrangement, a more elegant and attractive botanical periodical is not to be found in the United States. The engravings are of a superior character, and lend an unusual degree of attraction and interest to its perusal.

So far as the medical properties and therapeutic uses of the agents which it embraces are concerned, they are also of a reliable character.

The "Family Flora" is well adapted to the use of the medical student and the physician who are desirous of acquiring a critical knowledge of Medical Botany. It is likewise a highly instructive publication for the use of families, and none should be without it.

I trust the gentlemanly author will meet with that encouragement which his zeal, industry, and indefatigable energies justly merit at the hands of a liberal profession, as well as an enlightened public.

L. E. JONES, M. D., *Cincinnati, Ohio.*

From the New Jersey Medical Reporter, Burlington, N. J.

GOOD'S FAMILY FLORA AND MATERIA MEDICA BOTANICA, &C., &C.— This work is now in its fourth year, and though we have never had an opportunity before of presenting it to our readers, we do so now with pleasure. It is a work published at Cambridge, Mass., and offers to the profession, in a cheap and convenient form, an account of the botanical, chemical, and medical properties, as well as the natural history, of indigenous and other plants, that may at all times be made available to the medical practitioner, and particularly to the country physician, in the treatment of disease. Each part contains twelve colored plates, and a mass of valuable information is condensed in a compact form, which ought to be within the reach of every physician. The proprietor is his own engraver, printer, agent, and editor, and we cheerfully urge upon our readers the claims of his valuable production, and hope that the "FAMILY FLORA" may increase its circulation at least tenfold.

Address (*post paid*) Peter P. Good, Cambridge, Middlesex County, Mass.

From the Medical Journal, Ohio.

GOOD'S FAMILY FLORA AND MATERIA MEDICA BOTANICA.—We have carefully perused the Family Flora, which the author, Peter P. Good, Cambridge, Mass., has had the kindness to forward to our address. This periodical is printed semi-monthly, but distributed to subscribers quarterly; twelve numbers being bound together in pamphlet form.

It is devoted to the botanical analysis and medical properties of both indigenous and foreign medical plants.

Each number is embellished with one very superior drawing of some medical plant, which tends greatly to beautify the work.

For neatness and elegance of style, we know of no pamphlet which exceeds this.

The drawings are colored, and true to the living plant, while the natural history, botanical analysis, and chemical and medical properties, together with the adaptation of the agent to the cure of many diseases, are very accurately and very systematically presented. No similar production with which we are acquainted surpasses, if, indeed, it equals this in the accuracy of its botanical descriptions; the description of the therapeutic virtues of many of the articles noticed possesses equal merit.

The author appears to be familiar with many of the plants not in use as remedial agents in the allopathic school of medicine, but which are in very common use amongst the eclectic class of physicians. This speaks well for his liberality, and clearly manifests a disposition to keep up with the improvements of the science.

The work is interesting and instructive, and recommends itself to the notice of every reformer in medicine.

L. E. J.

We take pleasure in submitting also the following notices, taken at random from several hundred of the most popular newspapers and other publications : —

Good's Family Flora has been received. It is, as usual, a neat and well-executed work, and is replete with interest, and cannot be too extensively patronized. We would recommend it especially to physicians. — *Mercersburg Visitor.*

Good's Family Flora. — This periodical continues to maintain its character for research and ability, and has strong claims on the patronage of a liberal and enlightened public. We think every family should possess it. — *Bennington State Banner.*

Good's Family Flora. — This interesting, valuable, and scientific work has been received. We recommend it to all heads of families as well worth their patronage. No book more effectually combines pleasure with improvement. — *Ohio Democrat.*

Good's Family Flora. — We consider this decidedly one of the best, most val uable, and cheapest publications of the day. — *Scion, Clarksburg.*

Good's Family Flora. — The March number has arrived. It fully sustains its former reputation, scientific, and well adapted to the general reader. Its price places it within the reach of all. — *St. Clairsville Gazette.*

Good's Family Flora. — One of the most valuable works in which the medical student can apply for assistance in the prosecution of his studies. — *Medico-Chirurgical Review.*

Good's Family Flora. — The drawings are executed with the skill of the most accomplished copyist, and the coloring of the plates is done in such a manner as to reflect high credit on the artist. — *Medical Times.*

Good's Family Flora. — The indefatigable author seems to have explored all the labyrinths of knowledge from which important facts and opinions could be gleaned for the instruction of his readers. We most cheerfully commend the work to those who are not already familiar with its merits. — *Western Journal of Medicine and Surgery.*

Good's Family Flora. — Each subject is considered in reference to its analysis, its physical and chemical properties, preparations, uses, and doses. All of these are briefly sketched in a concise and lucid manner, and in a way to show that a master-hand was employed in the task. — *N. Orleans Medical and Surgical Journal.*

Good's Family Flora. — One of the few books which supply a positive deficiency in our medical literature. The engravings by which the several plants are illustrated are better than any thing hitherto attempted in Materia Medica, and must prove a great assistance to the student, appealing as they do more powerfully to the mind than the most careful verbal descriptions taken alone would do. — *Medical Gazette.*

Good's Family Flora. — We had the pleasure of noticing in a former number the first volume of this excellent work, and of expressing our high sense of its value. We need say little more, therefore, of its continuation, than that it fully sustains the character of its predecessor, both in regard to the value of the scientific matter, especially interesting to the general reader, and the numerous illustrations of the various subjects treated in the work. — *Franklin Institute Journal.*

Good's Family Flora. — We have long known that Mr. Good was preparing this work for the press, and have looked for its publication with a conviction that we should derive much valuable information from its perusal ; an expectation that has been fully justified by the result. This work is not one which can fall stillborn from the press, as it is not one of those ephemeral productions that must sell at the moment or never. — *U. S. Monthly Review.*